The RUBBER AGE

June, 1946

TECHNOLOGY DEPT

New PRODUCTS

TELLURAC

Tellurium diethyl dithiocarbamate.
Accelerator for Butyl Rubber.

VanWax

Both clear and black for finishing and coating rubber goods.

VANSTAY

Stabilizer for vinyl chloride and copolymers.

R. T. VANDERBILT CO., INC.

230 Park Avenue, New York City

Du Pont
NEWSLETTER No. 6, JUNE 1946
RUBBER CHEMICALS DIVISION
PUBLISHED BY E. I. DU PONT DE NEMOURS & CO. (INC.), WILMINGTON 98, DELAWARE

NON-AROMATIC SOLVENTS FOR NEOPRENE

NON-AROMATIC neoprene cements can be prepared which are economical, non-toxic and have a wide range of evaporation rates. Blends of ketones or acetates with aliphatic hydrocarbons may be used as solvents. Neoprene cements employing a mixture of aromatic and non-aromatic solvents can also be formulated.

Heretofore, cement manufacturers have generally used aromatic hydrocarbons such as toluene, or blends containing a large proportion of these aromatic hydrocarbons, as the solvent in the manufacture of neoprene cements. Although these types of solvents make satisfactory cements they have several disadvantages such as toxicity, relatively high cost and limitation of control of evaporation rate.

ADVANTAGES OF NON-AROMATIC SOLVENTS

Non-aromatic solvents for neoprene have the following advantages over those based on aromatic hydrocarbons.

1. Greater control of solvent evaporation rate.
2. Lower cost.
3. Elimination of toxicity of aromatic hydrocarbons.
4. Less processing labor (in many cases it is unnecessary to masticate the neoprene before dissolving).
5. Low coefficient of penetration into porous surfaces such as fabric and leather.
6. Better storage stability of cements with respect to decrease in viscosity.

The greatest apparent disadvantage is that the viscosity per unit solids content is lower than that obtained when using straight aromatic hydrocarbons, and somewhat more neoprene may be required to obtain the desired viscosity.

TWO-COMPONENT SOLVENT BLENDS FOR NEOPRENE

Blend Component A	Blend Component B	Minimum to Maximum Range of Component A to Give Smooth Solution % by Volume
Acetone	Cyclohexane	30 - 60
Acetone	Hexane	30 - 60
Acetone	Heptane	30 - 60
Acetone	65 Octane Gasoline	20 - 60
Acetone	Kerosene	30 - 60
Methyl Ethyl Ketone	Hexane	30 - 100
Methyl Isobutyl Ketone	Hexane	30 - 100
Methyl Acetate	Hexane	30 - 60
Ethyl Acetate	High Test Gasoline	40 - 80
Benzene	High Test Gasoline	40 - 100
Toluene	High Test Gasoline	40 - 100

SELECTION OF SOLVENT

By selecting the various solvent components, cements differing in physical characteristics may be obtained. For example, a Neoprene GR-M cement made in a blend of methyl acetate, 30 volumes and high test gasoline, 70 volumes, contains methyl acetate as the more rapid evaporating component. Films of this cement lose their methyl acetate first, leaving a film of neoprene, and gasoline in which neoprene is not soluble. Because neoprene is not soluble in the residual liquid and comparatively little of the gasoline is absorbed by the neoprene, the total liquid evaporates rapidly and very high initial bond strength is obtained. This cement has the disadvantage, however, that due to the rapid loss of methyl acetate and consequent speedy transfer of the blend from a solvent to a non-solvent, the applied film is apt to be rough and lumps of neoprene may collect in the brush. As a result, this type of cement may not always be practicable.

If methyl ethyl ketone is substituted for methyl acetate in the above cement, the gasoline non-solvent portion becomes the lower boiling component and evaporates at a faster rate than does the methyl ethyl ketone. This being the case, the ratio of methyl ethyl ketone to gasoline becomes greater as the applied film loses solvent. Inasmuch as Neoprene GR-M is soluble in blends of methyl ethyl ketone and gasoline containing from 30% to 100% (by volume) of methyl ethyl ketone, the residual blend at all times is a neoprene solvent, and consequently, the cement will spread smoothly and will not exhibit any appreciable stringiness.

For further information on non-aromatic solvents for neoprene, write for our technical report BL-207.

DU PONT
BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

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SUPERB OIL RESISTANCE

is only one of Hycar synthetic rubber's unusual and valuable properties. Others are listed in the box at the right.

But most important, these properties may be had in an almost limitless number of combinations, each designed to meet specific service conditions of the finished Hycar part.

Our files contain more than 5000 recipes for Hycar compounds—each compound engineered to do a certain job. Parts made from HYCAR have seen service in *every* industry, giving long life, dependability, and economical operation.

That's why we say, ask your supplier for parts made from Hycar. Test them in your own application, difficult or routine. You'll learn for yourself that it's wise to use HYCAR for long-time, dependable performance. For more information, please write Department HD-6 B.F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio.

CHECK THESE SUPERIOR FEATURES OF HYCAR

1. EXTREME OIL RESISTANCE — insuring dimensional stability of parts.
2. HIGH TEMPERATURE RESISTANCE—up to 250° F. dry heat; up to 300° F. hot oil.
3. ABRASION RESISTANCE—50% greater than natural rubber.
4. MINIMUM COLD FLOW—even at elevated temperatures.
5. LOW TEMPERATURE FLEXIBILITY—down to —65° F.
6. LIGHT WEIGHT—15% to 25% lighter than many other synthetic rubbers.
7. AGE RESISTANCE—exceptionally resistant to checking or cracking from oxidation.
8. HARDNESS RANGE—compounds can be varied from extremely soft to bone hard.
9. NON-ADHERENT TO METAL—compounds will not adhere to metals even after prolonged contact under pressure. (Metal adhesions can be readily obtained when desired.)

Hycar
Reg. U.S. Pat. Off.

LARGEST PRIVATELY PRODUCED BUTADIENE TYPE

Synthetic Rubber

B. F. Goodrich Chemical Company

A DIVISION OF THE B. F. GOODRICH COMPANY

This advertisement appeared in a long list of carefully selected business papers TO HELP YOU SELL parts made from HYCAR.

You get CHAMPION PERFORMANCE *with*

PHILBLACK A

If you want champion qualities in your products . . . qualities that enable them to take a lot of hard knocks and not fail . . . resistance to cut and crack growth . . . in a word, if you want your products to give champion performance...use Philblack A.

These are a few of the Philblack A features that help make your products winners! High hot tensile . . . good heat and electrical conductivity . . . good abrasion . . . low set . . . high modulus . . . excellent appearance of finished product . . . *and always* . . . easy processing and fast curing!

PHILLIPS PETROLEUM COMPANY

Philblack *Division*

EVANS SAVINGS AND LOAN BUILDING · AKRON 8, OHIO

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Here are just a few of the thousands of products that can be made from GEON polyvinyl materials. Upholstery material, for example, that is practically wearproof, easy to clean because dirt or ink or even acid can't penetrate the surface; a dish drainer and drain mat that won't ever get gummy from the effects of soaps or foods; colorful, dirt and chemical resistant floor tile that can't be marred or scuffed; lovely handbags that can be washed again and again and never lose their attractive appearance; handsome luggage that is practically indestructible; mirror-finish materials for shoe parts and other applications.

Note that these are all applications of calendered or molded sheet. In addition, GEON can be cast or calendered as film, pressure or injection molded, and extruded. In solution or latex forms GEON can be used to coat fabrics and fibres of all kinds as well as paper and board. In all these forms it can be made to resist sunlight, heat, cold, aging, oils and greases, acids and alkalies, abrasion and wear, water, and most other normally destructive factors.

Rainwear, packaging materials, acid tank linings, fly swatters, wire and cable insulation are just a few examples of the wide variety of applications for GEON. While we make no finished products of GEON, we'll be glad to work with you on any special problems or applications. Just write Dept. K-6, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio. In Canada: Kitchener, Ontario.

Geon
Polyvinyl Materials

B. F. Goodrich Chemical Company

A DIVISION OF
THE B. F. GOODRICH COMPANY

For technical data please write Dept. RB-6

B. F. Goodrich Chemical Company

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THE B. F. GOODRICH COMPANY

ROSE BUILDING, CLEVELAND 15, OHIO

Products with a *definite* purpose

Bunac K-17

Purpose . . . To give you GR-S stocks with level curing properties, better aging characteristics, and increased flex crack resistance.

Naftex

Purpose . . . To give you a free-flowing pellet mixture of carbon black and sulfur-reactive plasticizer that will reduce mixing time, reduce carbon black dust, and eliminate the handling of liquid plasticizers in your plant.

Wilcor-Plast

Purpose . . . To give you an exceptionally low-cost plasticizer for general use in synthetic, natural, and reclaimed rubber compounds.

Wilmac D-X

Purpose . . . To give your highly loaded Silene-GR-S stocks easier mixing and better processing properties, with reduced adherence to mill rolls.

Plasticizer Emulsions

Purpose . . . To give you water dispersions of rubber plasticizers that can be used to advantage in latex compounds and adhesives.

Wilcorite R-30

Purpose . . . To give you a modified phenolic resin that is specifically designed to impart tack to GR-S.

Wilcorite R-10H and R-11H

Purpose . . . To give you modified phenolic resins for use with BUNA N type rubbers, with the possibility of obtaining a wide range of unique properties.

Wilcorol P-200W

Purpose . . . To give you an all-purpose resorcinol adhesive for bonding a large variety of dissimilar materials, including rubber.

Wilcor Reclaiming Oil No. 111

Purpose . . . To give you a reclaiming oil that will swell both GR-S and natural rubber scrap to the same extent.

WILMINGTON

CHEMICAL CORPORATION

10 EAST 40TH STREET • NEW YORK 16, N. Y.

PUSS IN BOOTS

THE famous story does not state whether or not the boots were made of rubber. We do know that Puss would have been highly pleased with rubber footwear in which PELLETEX was used in the compound.

Manufacturers of rubber boots, overshoes, heels and soles find PELLETEX, leading semi-reinforcing furnace black, extremely economical as well as easy to process. PELLETEX Compounds age well, have high resistance to oil and solvents, and make rubber footwear that has superior resilience and freedom from cracking.

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RUBBER H AND M PIGMENTS Chemicals

The Best Cements begin with

CHEMIGUM N-I

IF you're looking for the ideal synthetic rubber base for adhesives, you'll be more than satisfied with **Chemigum N-1.** This oil-resistant, *heat-softening* product of Goodyear Research offers the following outstanding advantages:

HIGH DEGREE OF ADHESION
to many types of surfaces

HIGH FILM STRENGTH
high initial wet strength

COMPATIBILITY
with large variety of plasticizing and reinforcing materials

COMPLETE SOLUBILITY
in ketones and esters and chlorinated solvents, with high solids and low viscosity

EASE OF APPLICATION
can be modified to produce adhesive with good brushing or spraying qualities

LONGER TACK PERIOD
may be reactivated before laying up, if necessary

HEAT-SOFTENING
reduces milling time—saves valuable labor

CHEMIGUM N-1
is now being produced in quantity, assuring you a dependable source of supply with uniformity carefully controlled. For complete information, write: Goodyear, Chemical Products Division, Plastics and Coatings Department, Akron 16, Ohio.

Chemigum (pronounced Kem-e-gum)—T. M. The Goodyear T. & R. Co.

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THE GREATEST NAME IN RUBBER

IT'S "TOPS"

- **SUPERIOR ELECTRICAL TESTS**
- **HEAT STABILITY**
- **COLOR**

Sample and technical data sent promptly on request

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NEW YORK

NOW

CYCLOHEXANE

FROM *Petroleum*

Another Phillips "1st"—Cyclohexane from petroleum in tank car quantities... announced for the first time ...at a Price Competitive with Benzene and Toluene.

PROPERTIES

(Current Production)

PRODUCT ANALYSIS	Mol %
Normal Hexane	1.0
Methylcyclopentane	1.0
2,2-Dimethylpentane	3.3
2,4-Dimethylpentane	5.8
CYCLOHEXANE	86.1
3-Methylhexane	2.8

DENSITY at 20° C.	0.7728
REFRACTIVE INDEX at 20° C.	1.4224
KAURI BUTANOL VALUE	48.0
DIMETHYL SULFATE VALUE, %	7.0
ACID WASH COLOR NUMBER	3.0
BOILING RANGE ° C.	78-80
FREEZING POINT ° C.	-13

All other components are unreactive paraffinic hydrocarbons thus making Phillips Cyclohexane especially valuable as a chemical intermediate. Minimum toxicity, good solvent power, and low price place this new product on a competitive basis with benzene and toluene. Cyclohexane offers especially interesting possibilities in the rubber, paint and lacquer fields and presents additional application opportunities in numerous other industries where cost has made its use prohibitive in the past. Phillips Cyclohexane is now available in quantities from 1 gallon to tank cars. Write today for further information.

PHILLIPS PETROLEUM COMPANY

Chemical Products Department

BARTLESVILLE, OKLAHOMA

NOW!

4 BUTAPRENE N POLYMERS

TO MEET YOUR SPECIAL NEEDS

NXM Maximum resistance to aromatic solvents, naphthenic oils, chlorinated hydrocarbons. High tensile strength, excellent elongation, low compression set.

NL Fuel and oil-resistant; good tensile strength and elongation. Resists stiffening at low temperatures. Recommended for molded or extruded oil-resisting rubber parts at low cost.

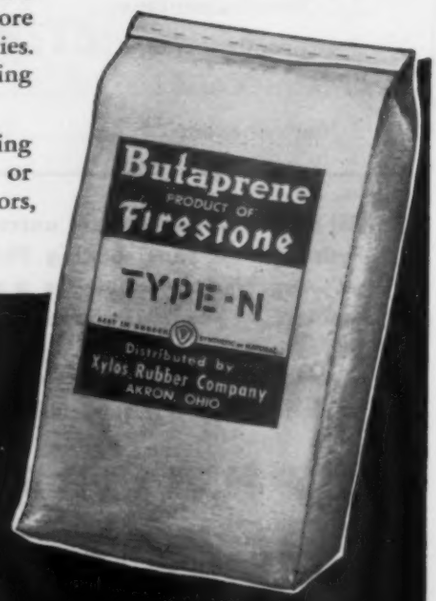
NF Extremely high resistance to stiffening at sub-zero temperatures. Compounds will pass both brittle point and ASTM bend tests at temperatures as low as —70° F. Fuel and oil-resistant, low compression set.

NAA Requires no plasticizers. Outstanding for use in oil-resistant and solvent-resistant compounds where leaching out of plasticizer would affect taste or flavor or cause loss of seal due to shrinkage in rubber volume.

THE Butaprene family is growing. With the recent addition of type NAA, a new easy processing elastomer, there are now *four* outstanding Butaprene N polymers to help solve your rubber problem. Besides the many desirable physical properties of each polymer, two or more elastomers may be combined to give you even more versatile properties. All Butaprene N types are available in non-staining and non-discoloring polymers that will neither darken nor fade.

The Butaprene technical staff will be glad to work with you in solving any problem involving the use of these elastomers in either latex or solid form. Simply write XYLOS RUBBER COMPANY, Distributors, Akron 1, Ohio.

Listen to the Voice of Firestone every Monday evening, over N. B. C.



BUTAPRENE N by Firestone

THE SYNTHETIC RUBBER OF A THOUSAND USES

Resists: OIL • GASOLINE • HEAT • SUB-ZERO COLD • AGING • ABRASION

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You're looking at a cone of precision wound rayon tire cord that weighs more than 18 pounds—the largest ever produced. Never before was there so colossal a cone of rayon.

It came into being because a tire manufacturer needed it to maintain maximum operating efficiency in feeding cord into the latex bath. Smaller cones would have required more frequent replacements.

To produce these huge cones of strong, knotless Tyron cord, many ingenious adaptations of existing machinery were necessary. Thanks to the "know how" and perseverance of Industrial's engineers, this and many other new developments have been added to the growing list of Industrial's chemical, mechanical and textile achievements.

Just look over these accomplishments! CONTINUOUS PROCESSING and its adaptation to REEL SLASHING of tire yarn; LEKTROSETTING, the electronic method of setting twist in tire cord; UPTWISTING of yarn to produce cord; MULTIPLE BEAM WEAVING of tire cord fabric. They represent the kind of thinking and the kind of doing that is available for your needs now that Uncle Sam no longer wants first call.

It's called **GIANT CONING** Remember it!

Industrial RAYON CORPORATION
CLEVELAND, OHIO
NEW YORK OFFICE 500 FIFTH AVE.

MAKERS OF

*Span-lo RAYON YARN AND CLOTH and *TYRON YARN, CORD AND FABRIC

*Reg. U.S. Pat. Off.

Reclaim your synthetic scrap

with POLYMEL "6"

and POLYMEL "AX"

by cold plasticization

Typical synthetic cured scrap compounds:

COMPOSITION	
GR-S cured scrap	100.0
Butyl cured scrap	10.0
Neoprene scrap	10.0
Polymel plast. No. 6	35.0
Polymel plast. No. 7 liquid	5.0
Zinc oxide	2.0
Cumate	0.3
Sulfur	1.4
Cure 8 min. at	305° F.

PHYSICAL TESTS

Shore hardness	**72**
Tensile	**908 p.s.i.**
Elongation	**295%**
Per. set at break	**18%**
Material cost	**0.0237 cts. a lb.**

COMPOSITION		
GR-S cured tire tread	100	100.0
Plasticizer Polymel No. 6	30	30.0
Curative master batch	13	.....
Total	143	

MASTER BATCH

GR-S rubber	67.0	6.7
Philblack A	28.5	2.85
Zinc oxide	20.0	2.0
Sulfur	12.0	1.2
Cumate	2.5	0.25
Totals	130.0	143.0
Cure 8 min. at		307° F

PHYSICAL TESTS

Shore hardness	**67**
Tensile	**1080 p.s.i.**
Elongation	**365%**
Per. set at break	**16%**
Material cost	**0.0462 cts. a lb.**

COMPOSITION	
GR-S cured scrap	100.0
Polymel plast. No. AX	20.0
Zinc stearate	0.5
M.B.T.S.	0.8
Sulfur	1.0
Cure 8 min. at	307° F.

VULCANIZATION TESTS

Shore hardness	**70**
Tensile strength	**745 p.s.i.**
Elongation	**250%**

Cost of material 0.0221 cents a lb. based on crude scrap at 0.0125 cts. a lb.

For further data, please write

THE POLYMEL CORPORATION

LINCOLN BOULEVARD **MIDDLESEX, NEW JERSEY**

"You'll get made-to-order results from that Flintkote product!"

"We've subjected that adhesive to exhaustive laboratory tests . . . and it meets every requirement you outlined. It forms an ideal bond . . . it's virtually made to order for your job."

In Flintkote's wide range of products you'll find characteristics which enable many of them to be used "as is"... or with further compounding. Aqueous dispersions of elastomers, synthetic rubber and resin latices, and asphalt emulsions are now being produced in large quantities.

Flintkote technical representatives are available to study your individual problems. These men, well grounded in the rubber industry, will apply their knowledge of Flintkote's diversified line of products to the development of money-saving, time-saving and trouble-saving materials for you.

Some famous Flintkote products used widely by Industry are; Syntex*—aqueous dispersions of rubbers and resins . . . Hydralt—stable asphalt emulsions for waterproofing and corrosion protection . . . Flintkote Flooring Emulsions for heavy-duty mastic floors . . . saturants, sizings, impregnants, insulation coatings and many others.

If you have a processing or plant maintenance problem, present it to Flintkote today.

*Reg. U. S. Pat. Off.

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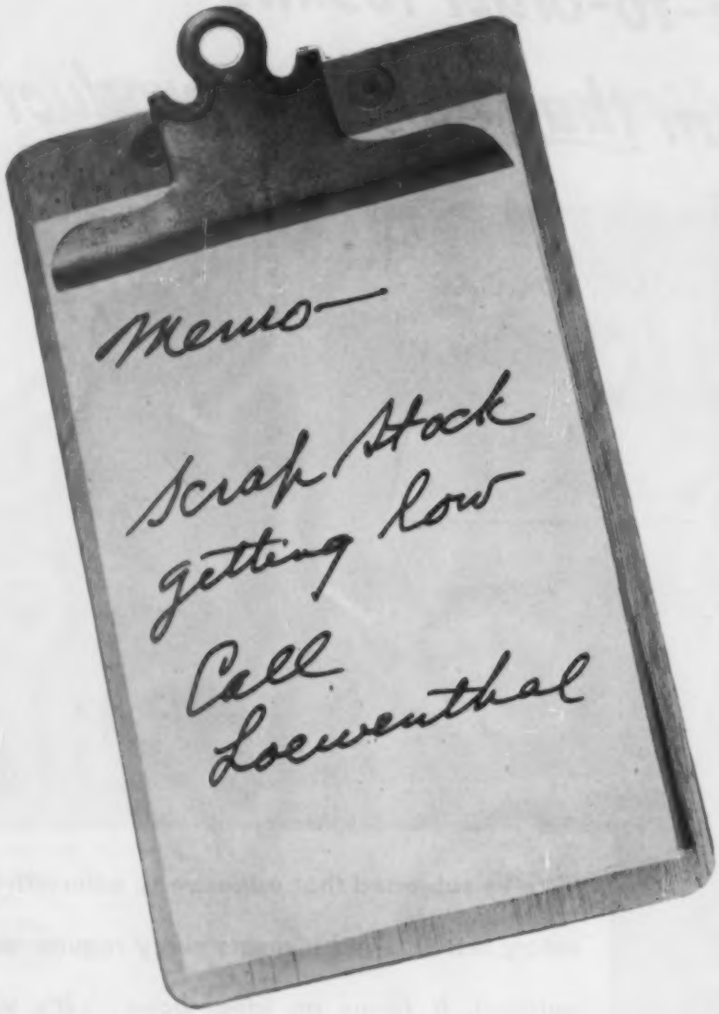

Just a Memo, but—

Similar memos can frequently be found on the desks of purchasing agents of leading reclaimers for the reason that we have been serving that industry since its beginning with expertly sorted scrap rubber meeting customers' specifications. We have the "know-how" based on experience.

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JACK SIDER, *President* J. K. McELLIGOTT, *Exec. Vice-Pres.*

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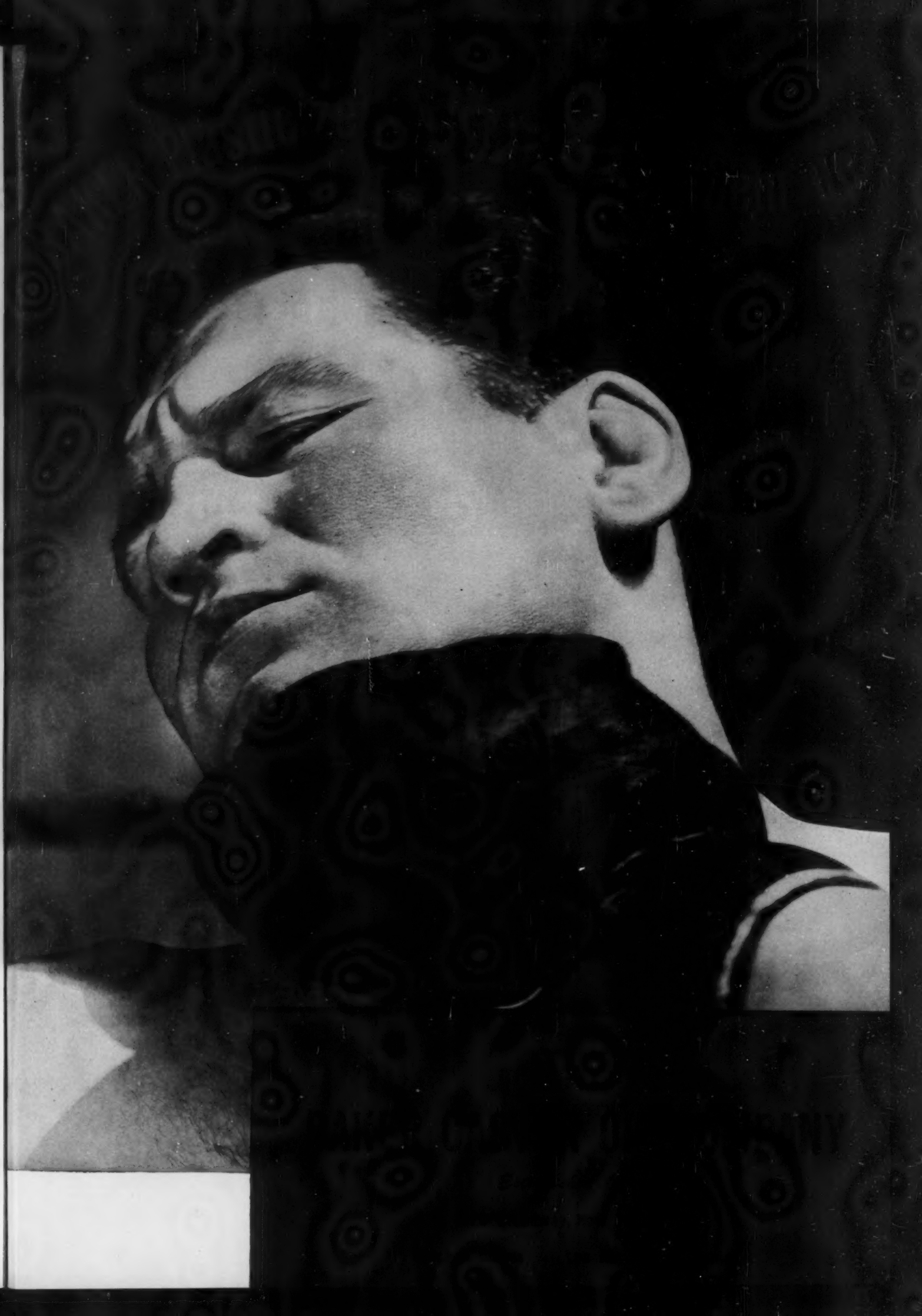
AKRON 5, OHIO

Cable Address: "Gyblowell"



TITANOX ... *the brightest name in titanium pigments*

IN PAINT Titanox-A gives opacity, promotes brightness, resists fading and adds durability to coatings for both interior and exterior use. IN PAPER Titanox A imparts the important qualities of opacity, brightness and printability, and is easy to handle because of its ready dispersion quality. IN RUBBER Titanox-A supplies a high degree of whiteness, develops resistance to abrasion and sun discoloration. IN INKS Titanox-A assures greater color stability and opacity.
INK

TITANOX-A
...another First!

In 1925, Titanox-A (Titanium Dioxide) was developed at Niagara Falls, New York, as a result of research by the staff of The Titanium Pigment Company, Inc. This was the first pure titanium dioxide pigment commercially produced in the United States... another "TITANIUM PIGMENT FIRST".

This new product was superior to any other Titanium pigment available up until that time and even approached present-day Titanox-A in opacity, whiteness and brightness. These improved characteristics make versatile Titanox-A the preferred pigment for a great variety of uses.

While keeping quality uniformly high, the makers of Titanox pigments are also exerting every effort toward increasing output to meet a tremendously expanded industrial need.

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SOLE SALES AGENT

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UNITED BLACKS, uniform, dependable, are custom-built for particular tasks. Among UNITED BLACKS is the one made for your special use. UNITED'S bags, as the illustration shows, are easy to handle, easy to recognize. For all-round performance, for all-round convenience use dependable UNITED BLACKS.

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MEASURING HEAT GENERATION IN RUBBER WITH A FLEXOMETER IN UNITED'S LABORATORY

Status of Carbon Black

Time has proven and established the vital need for carbon black in reinforcing rubber. A growing carbon black industry has met the ever-increasing demand with both quantity and quality. Today's requirements call for cool mixing, easy processing carbon blacks, which possess maximum reinforcement, low heat generation, best aging and peak resistance to wear, tear, flexing and cut-growth. UNITED CARBON, INC., is continuously providing improved types so essential to the success of post-war tires and will help your Company keep posted on new developments brought about by research. For carbon blacks of merit, uniformity and dependability, use UNITED BLACKS.

Would you like to have a copy of "Developments and Status of Carbon Black"? It will be sent you on request.

RESEARCH DIVISION

UNITED CARBON COMPANY, INC.

Charleston 27, West Virginia

3 Reasons for using

PC FOAMGLAS INSULATION

in your plant

The ideal insulating material should be (1) efficient, (2) economical, (3) permanent. PC Foamglas is widely known as the insulating material that meets *all* these requirements.

GIVING outstanding service on roofs, in floors, and core walls, PC Foamglas has licked the toughest insulating jobs—for good.

Composed of millions of tiny air-filled glass cells, PC Foamglas is *impervious* to moisture, vapor, vermin, the fumes of most acids, therefore retains its insulating efficiency. It helps to maintain temperature levels, to lessen condensation, *permanently*.

PC Foamglas is light, rigid, strong. It does not pack down, warp, rot, swell, or burn. Easily handled, quickly installed, PC Foamglas needs no repairs, maintenance or replacement during ordinary use. And that means *economy*, for with PC Foamglas, first cost is last cost.

We have published complete detailed information on PC Foamglas in three illustrated booklets. Send for your free copies today. Just check and mail the convenient coupon. You incur no obligation. Pittsburgh Corning Corporation, Room 172, 632 Duquesne Way, Pittsburgh 22, Pennsylvania.

· Also manufacturers of PC Glass Blocks ·

On large areas of flat deck roofs, which are typical of modern industrial construction, PC Foamglas insulation, used with built-up roofing, has proved effective and economical. The small picture shows how PC Foamglas insulation can be cut to fit, right on the job with ordinary tools.

PC FOAMGLAS *Waterproof Fireproof* **INSULATION**

T. M. REG. U. S. PAT. OFF.

Pittsburgh Corning Corporation
Room 172, 632 Duquesne Way
Pittsburgh 22, Pa.

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*City*_____ *State*_____

NATIONAL-STANDARD COMPANY
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Wire Braids flat and tubular in Steel or other metal. Tapes and Specialized Wire Products for Tire Beads, Steam Hose Armor, Reinforcement for Oil Well Drilling Hose. Braided Covering for Flexible Tubing, Aircraft and Tank Radio Shielding. Stranded Wire for reinforcing Flat and V Belts. Braided Covering for Electrical Cables. Drawn wire in small sizes down to .002, of Steel, Aluminum, Brass, Monel, Nickel Silver, Stainless Steel, Phosphor Bronze and other Alloys.

WORCESTER WIRE WORKS, DIVISION
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High quality Wire in small diameter sizes, down to .006. Round, Low and High Carbon Steel. Annealed, Hard Drawn, Tempered, Bright, Liquor Finish, Tinned, Copper Coated, Cadmium Coated, Galvanized.

THE ATHENIA STEEL COMPANY, DIVISION
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Cold Rolled, High Carbon Flat Steels in widths of ⅛" to 6½", Thickness .0015 to .062 Custom-made Steels—.60 Carbon and higher. Entire range of Annealed, Hard Rolled, Black Tempered, Tempered and Polished or Tempered and Polished with Blue or Straw Colored finish, Best quality Small Flat Springs.

WAGNER LITHO MACHINERY CO., DIVISION
HOBOKEN, NEW JERSEY

Complete lines of automatic equipment—designed, manufactured and installed for can companies and others using sheets in the metal decorating trade. Individual units consist of Roller Coating Machines, Conveyor Type Ovens and Auxiliary Equipment for tandem operation with lithographing presses, etc.

What Does This Trade-mark Mean?

SELDOM does this trade-mark label a stock item. Rather, it identifies a product specifically developed for a special application. It may be a type of steel for piston rings, stainless steel wire for sound recorders, or highly specialized braided wire for automobile tire beads.

Whatever product it is . . . from any one of the four divisions of National-Standard... you can be sure the N-S trade-mark means that the product is the result of: a careful study of the customer's methods of manufacture, an analysis of the performance required, rigid quality control to assure uniformity in every pound of the material developed.

This, plus the willingness of National-Standard engineers to tackle the toughest applications for their specialized products, makes theirs a unique service. Why not put these services to work for *your* benefit?

it's your move to Color...

THE RETURN of red tubes from war-time oblivion is setting the pattern for *moves to color* in many directions... In Drug Sundries, Mechanical Goods, and Footwear, COLOR will stimulate the change to stable peace-time markets . . . The return of white side-wall tires is a looming event for 1946 . . . In all of these production trends SILENE EF is a dominant factor because it is assuring greater success in color compounding . . . SILENE EF is essential in many non-black compounds of natural or synthetic rubber to give them the needed processing and good cured physical properties unobtainable when whitings or clays are used alone as the loading pigment.

SILENE EF

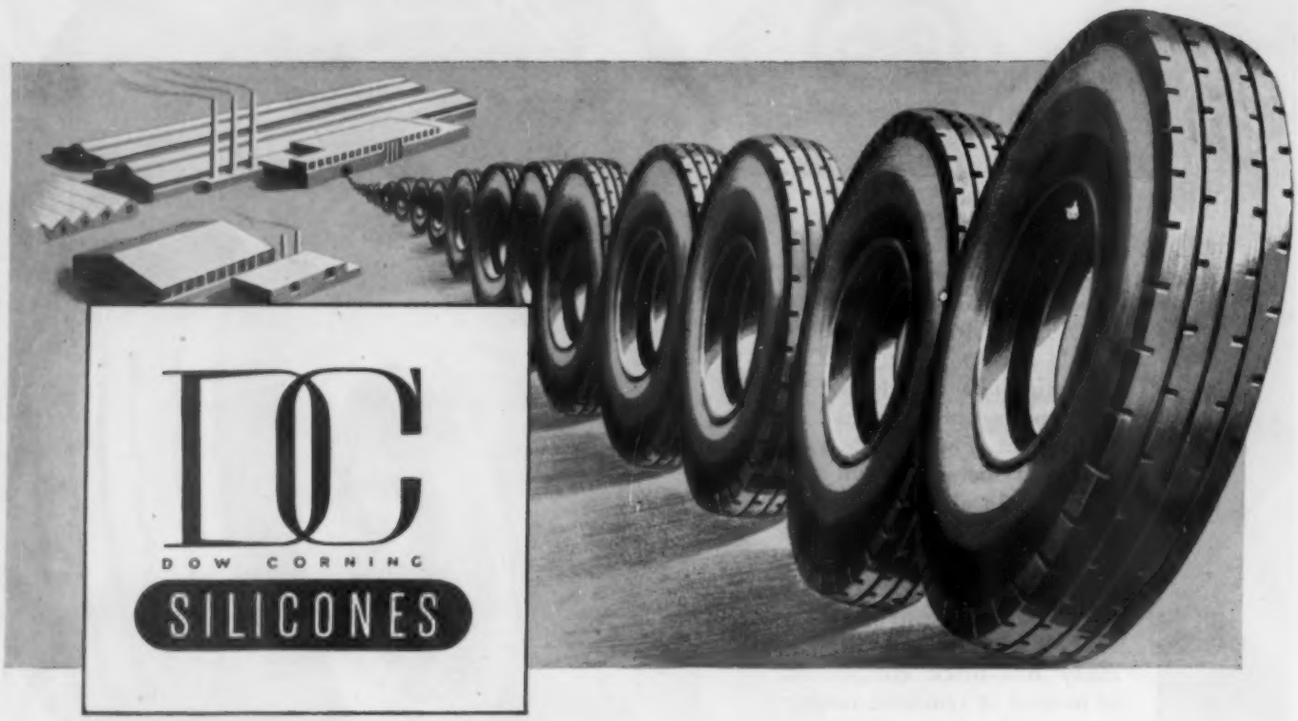
STANDARD Chemical Company

General Offices: AKRON 8, OHIO

New England: 335 Chamber of Commerce Bldg., Boston, Mass.
Mid-Atlantic: Broad Street Bank Bldg., Trenton, N. J.
Mid-West: 2724 W. Lawrence Ave., Chicago, Ill.
Pacific Coast: 1248 Wholesale St., Los Angeles, Cal.

NEW ECONOMY . . . NEW CONVENIENCE!

DC mold release fluid EMULSION NO. 35



Clean release—less scrap—lower production costs with this new release agent for rubber molding

Here's convenient, low-cost Emulsion No. 35 —specifically for rubber molding—that gives you clean release even when further diluted to contain as little as .25% DC Mold Release Fluid! Now you can cut finishing costs and reduce scrap with a ready-to-use emulsion. Easy to apply with spray or brush, it *does not build up on the mold*—and one application lasts for several moldings. No breaking-in period is required for new molds, and costly cleaning of old molds is eliminated. DC Mold Release Fluid Emulsion No. 35 also protects rubber from oxidation and deterioration caused by ozone. It remains colorless, too, and will not discolor white goods.

FOR RUBBER MOLDING
DC Mold Release Fluid Emulsion No. 35

FOR PLASTICS AND RUBBER
DC Mold Release Fluid

For further information, call the nearest Dow Corning office.

DOW CORNING CORPORATION
MIDLAND, MICHIGAN

Chicago Office: Builders' Building • Cleveland Office: Terminal Tower
New York Office: Empire State Building
In Canada:
Dow Corning Products Distributed by Fiberglas Canada, Ltd., Toronto

Dow Corning
FIRST IN SILICONES

General Chemical Fluorine Research Presents...

THE CATALYST TO CHART NEW COURSES FOR AMERICAN INDUSTRY

Boron Fluoride Etherate . . . valuable catalytic chemical of wide ranging potentialities for American Industry!

This new liquid fluorine compound has a multitude of uses. Technical literature—filling volumes—contains extensive data on the reactions catalyzed by BF_3 as well as by its complexes with other organic molecules. Repeated reference is made to its superiority to other catalysts since reactions are moderated and fewer undesirable by-products result.

Outlined at right are some of the principal applications for BF_3 as a catalyst. Perhaps they indicate ways in which you can utilize a chemical of these characteristics in your development or production program.

Boron Fluoride Etherate is commercially available in drums. For full information, contact General Chemical Company, Fluorine Division, 40 Rector Street, New York 6, N. Y. When writing, if you outline your proposed application for this new catalyst, the technical experts of our Fluorine Division can work with you toward an early solution of your problem.

Physical Properties

Formula:

C_2H_5 > O.BF_3
C_2H_5

Mol. Wt.	141.9
Melting Pt.	Less than —60°C
Boiling Pt.	125°C
Spec. Gr.	1.14 at 25°C
%BF_3	47.8% min.

Some of the Principal Reactions Catalyzed by BF_3

1. Polymerization of unsaturated compounds such as olefins, diolefins, vinyl ethers, fatty oils, and terpenes. The products may be solid polymers useful as plastics or liquids as in the bodying of drying oils for paints and varnishes.

2. Condensation of aromatic nuclei with olefins and diolefins, paraffins, and olefins, and aromatic nuclei or olefins with acids.

3. As a cyclizing agent for rubber.

4. As an esterification catalyst.

5. As a catalyst in the synthesis of aliphatic acids from alcohols and carbon monoxide.

6. As a promoter and dehydrating agent in the sulfonation and nitration of aromatic compounds.

GENERAL CHEMICAL COMPANY
40 RECTOR STREET, NEW YORK 6, N. Y.

Sales and Technical Service Offices: Atlanta • Baltimore • Birmingham (Ala.) Boston • Bridgeport (Conn.) • Buffalo • Charlotte (N. C.) • Chicago Cleveland • Denver • Detroit • Houston • Kansas City • Los Angeles Minneapolis • New York • Philadelphia • Pittsburgh • Providence (R. I.) San Francisco • Seattle • St. Louis • Utica (N. Y.) • Wenatchee Yakima (Wash.)

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BASIC CHEMICALS
GENERAL CHEMICAL COMPANY
FOR AMERICAN INDUSTRY

HARFLEX PLASTICIZERS

The RIGHT TYPE FOR YOUR PRODUCT

For

VINYL RESINS

SYNTHETIC RUBBERS

CELLULOSE ESTERS

We offer you in the HARFLEX Series a complete line of Plasticizers for Vinyl Resins, Synthetic Rubbers and other Plastics and Elastomers.

We have developed a variety of Plasticizers, each with its own special combination of properties. This enables the user to select that particular product most suited to his own needs.

Consult us if you have a Plasticizer problem. Our technical staff will be glad to assist you.

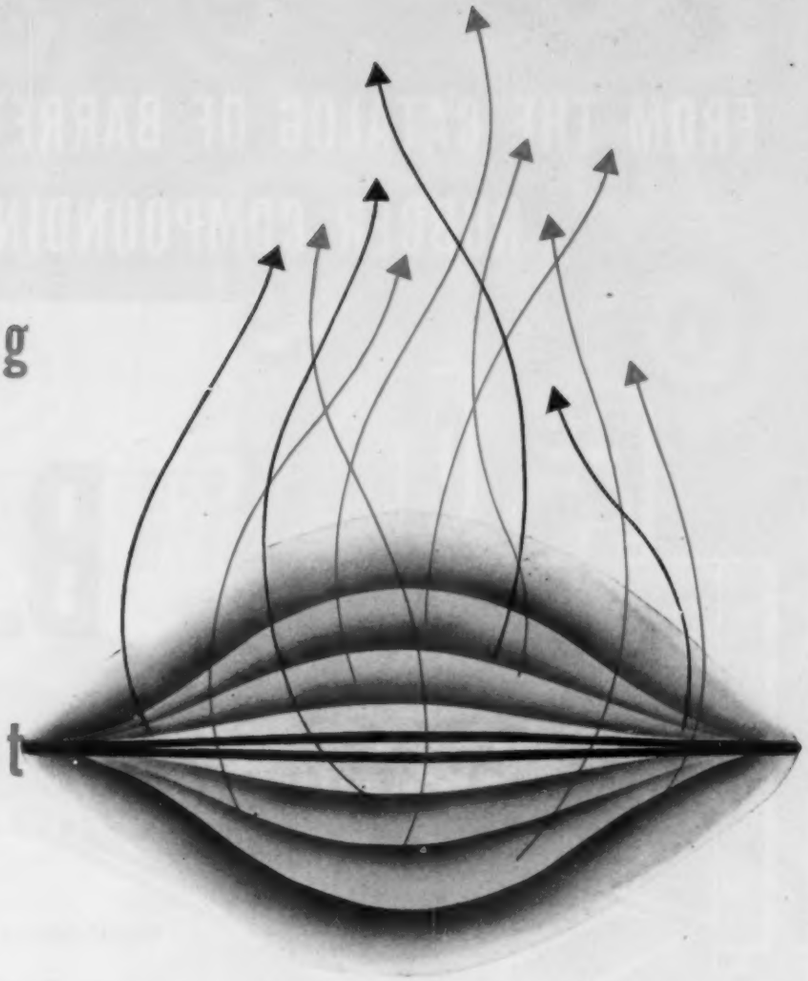
BINNEY AND SMITH CO. DISTRIBUTOR TO THE RUBBER INDUSTRY

HARDESTY CHEMICAL COMPANY, INC.

HARCHEM

41 EAST FORTY-SECOND STREET, NEW YORK 17, N.Y.

where flexing builds up heat



use MONSANTO LAMPBLACK No. 10

Because Monsanto Lampblack No. 10 has demonstrated a definite superiority in smoothness... with consequent less friction... it is preferable in all rubbers, especially natural rubbers, when flexing is a factor.

Also, this precision-produced black offers (1) maximum purity, (2) maximum carbon content, (3) uniformity, plus (4) a highly desirable blue-gray undertone.

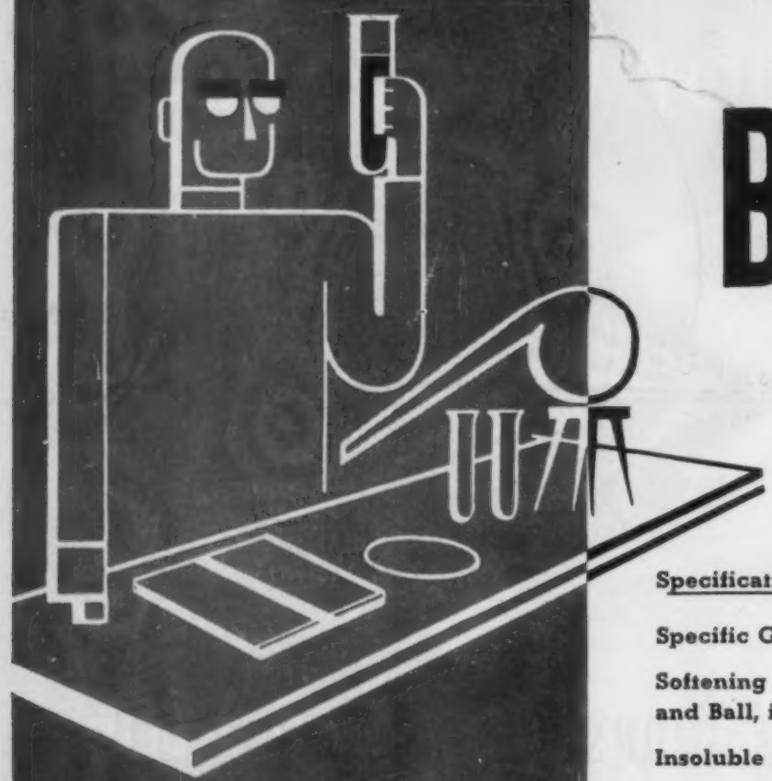
Look into Monsanto's Lampblacks for rubber, now. Samples, complete information, and technical counsel may be had by addressing: MONSANTO CHEMICAL COMPANY, Merrimac Division, 30 Rockefeller Plaza, New York 20, N. Y.

MONSANTO CHEMICALS

SERVING INDUSTRY... WHICH SERVES MANKIND

FROM THE CATALOG OF BARRETT

RUBBER COMPOUNDING MATERIALS...



B.R.C.*

NO. 20

B.R.C. No. 20 is a solid hydrocarbon derived from Coal Tar.

Specifications

Specific Gravity	1.25 to 1.32 @ 25°C/25°C
Softening Point, Ring and Ball, in Glycerine	175 to 185°F
Insoluble in Carbon Disulfide	15.0 to 25.0% by weight

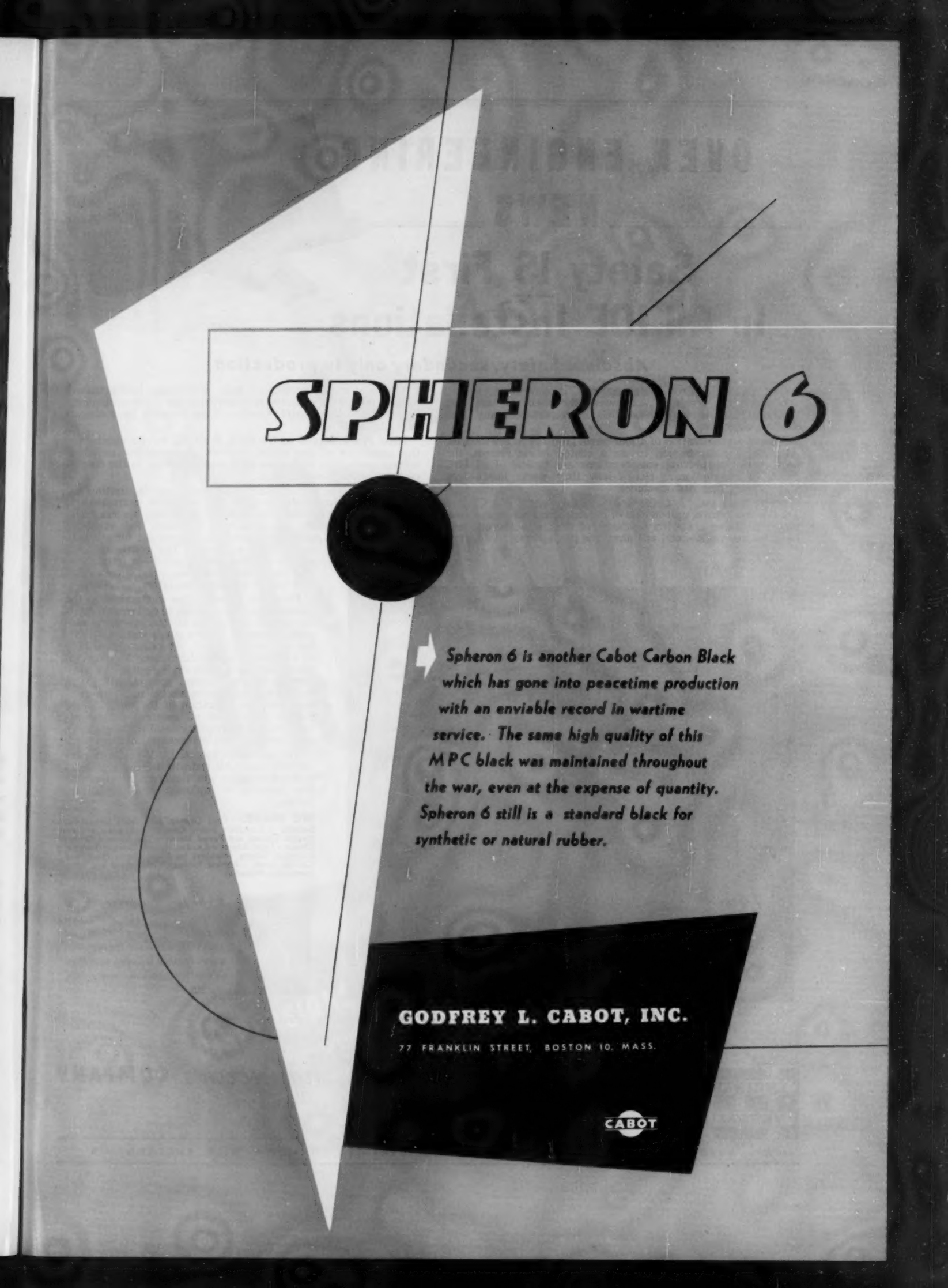
B.R.C. No. 20 is an inexpensive solid type softener which can be used to advantage in the design of many compounds. It is a reinforcing plasticizer and tends to impart good processing characteristics, especially in highly loaded low-cost compounds.

*Reg. U.S. Pat. Off.

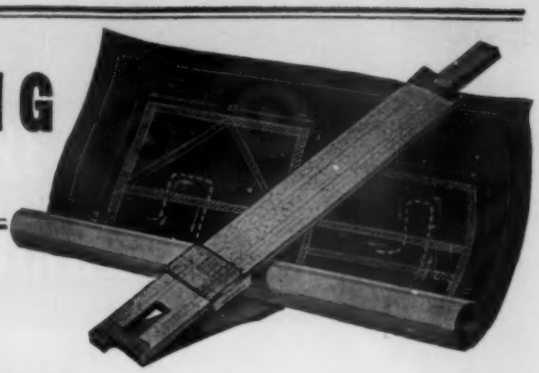
Barrett

THE BARRETT DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 Rector Street, New York 6, N. Y.

In Canada: The Barrett Company, Ltd.,
5551 St. Hubert Street, Montreal, Que.


SPHERON 6
Spheron 6 is another Cabot Carbon Black which has gone into peacetime production with an enviable record in wartime service. The same high quality of this MPC black was maintained throughout the war, even at the expense of quantity. Spheron 6 still is a standard black for synthetic or natural rubber.
GODFREY L. CABOT, INC.
77 FRANKLIN STREET, BOSTON 10, MASS.
CABOT

OVEN ENGINEERING NEWS



Safety IS First In All IOE Installations

Absolute Safety, secondary only to production

The Industrial Oven Engineering Company believes that production can reach its maximum only when the safety of personnel and equipment parallels in importance, any production objective.

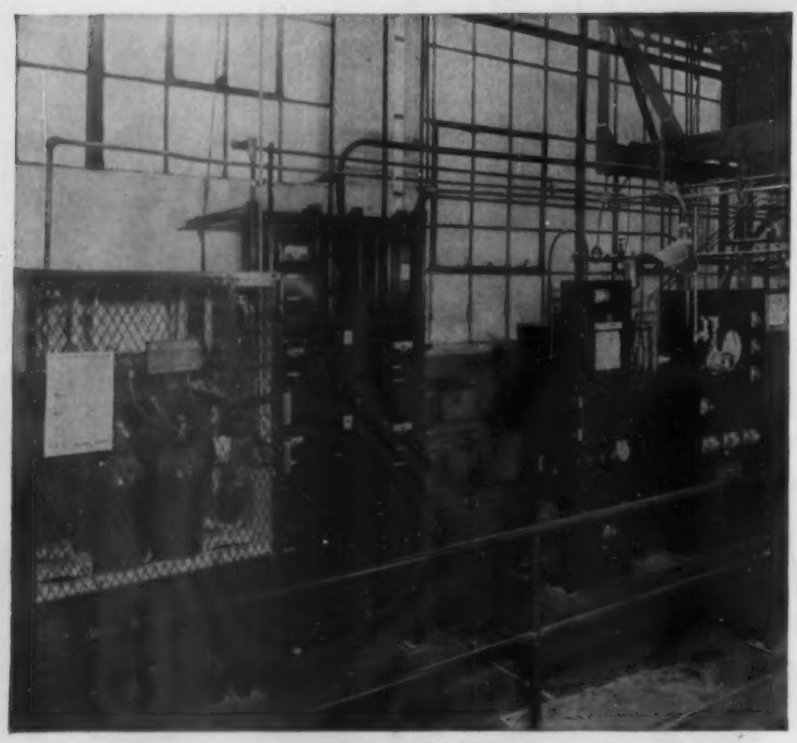
Here is an illustration of a four-panel group of safety devices. Although the illustration covers a coated fabric system, the same basic engineering considerations are typical of all **IOE** explosive installations. Here's how they work; here's how they protect men and machines.

Starting from your left, the first wire cage panel is a Carbon Dioxide fire control unit in case of a quick temperature increase, which produces a sudden discharge of CO_2 into the enclosed oven volume work space, and along the paths of material travel.

The equipment consists of fully automatic, heat-actuated releases positioned in strategic locations in the dryer equipment. Fire is almost immediately smothered out before it has a chance to do damage.

Panel No. 2, second to the right, is an AC service panel. On this panel are all the motor controls, disconnecting switches, voltage protectors, and other equipment essential to the control of the electric power system.

Panel No. 3 is a "tattletale" unit giving visible, continuous, record of the concentrations of the explosive mixtures and vapors at multiple points throughout the drying system. Explosive gas samples are thermally appraised for explosive content, and the results are continuously recorded for absolute operational evidence. The continuous analyzer—as this unit is called—is interlocked into the system and is equipped with audible and visible danger enunciators.



Panel No. 4, last in line to the right, is the explosion-proof temperature and main operating panel; combining all the operating stations necessary to give single station operating control to the unit. It consists essentially of recording temperature control at several places throughout the drying oven. In addition to this multi-point control, panel-type enunciator lights give visible notification of the operating condition of the unit. Push-button control of all motors, valves, accuators, and relays, incidental to the system's safe operation are incorporated in this board.

Yes, safety is essential. Without it production lags. All Industrial Oven Engineering installations are designed to eliminate the hazards of explosion and mechanical failure.

WE MAKE: Cord Coating, and Cable Lacquering Systems • Complete Fabric Cementing Systems • Continuous Takeup and Payoff Stands • Dip Tanks • Drying Ovens • Creel Rooms • Constant Speed, Constant Tension, Extrusion Takeup Machines for Plastic Resin Hose, and Coated Cords • Rubber Tubing, V-Belt Cord and other continuous Materials

Write for "Blueprint for Industry—Part III" gives full engineering information on the **IOE** *constant-speed, constant-tension windup machine for all continuous materials. FREE.*

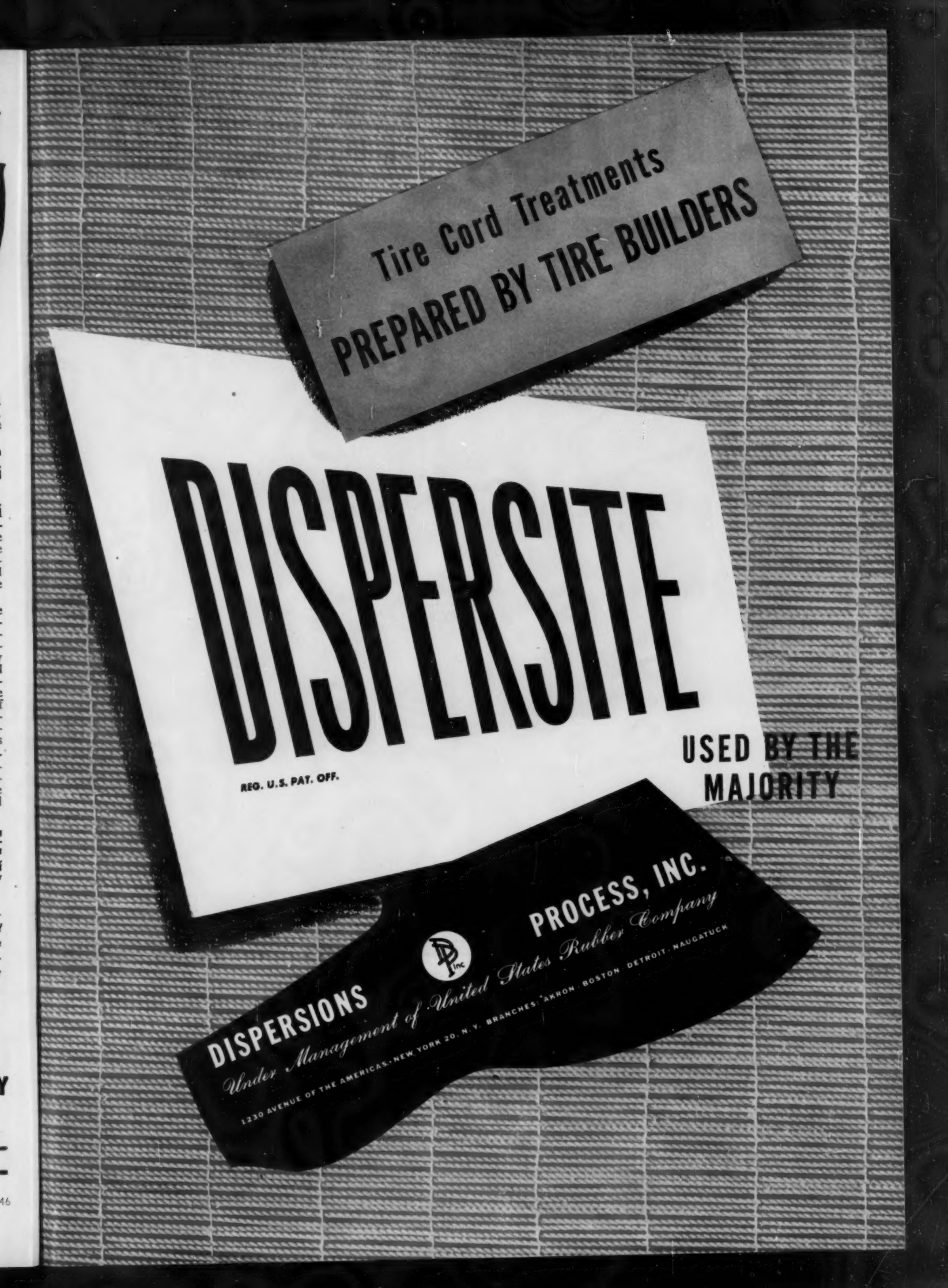
(This is Number 26 of a series. Reprints of previous advertisements sent on request.)

IOE ENGINEERING VERSATILITY

THE INDUSTRIAL *Oven Engineering* COMPANY

13825 TRISKETT ROAD, CLEVELAND 11, OHIO

★ ASSOCIATED COMPANY: JAMES DAY MACHINERY LTD., LONDON, W. 1, ENGLAND ★


Tire Cord Treatments
PREPARED BY TIRE BUILDERS
DISPERSITE
REG. U.S. PAT. OFF.
USED BY THE MAJORITY
DISPERSIONS
PROCESS, INC.
Under Management of United States Rubber Company
1230 AVENUE OF THE AMERICAS, NEW YORK 20, N. Y. BRANCHES: AKRON · BOSTON · DETROIT · NAUGATUCK

HERCULES RESEARCH

This mill is used by Hercules to investigate rubber compounding methods and to prepare samples for testing.

IT PAYS TO KNOW *MORE* ABOUT

HERCULES

GIVES RUBBER LONGER LIFE

When war-time emergencies demanded tougher, longer-wearing synthetic elastomers, Hercules answered the challenge. As a first step, Hercules built a well-equipped rubber testing and polymerization laboratory.

Working in close cooperation with the rubber industry, Hercules chemists developed Dresinate* 731, the resin emulsifier that made GR-S-10 possible, and is largely responsible for the success of GR-S-10 for automobile and truck tires and other rubber products.

Hercules research has also contributed to the longer life of *reclaimed* rubbers—with special solvents. Solvenol*, a strong solvent, with a slow evaporation rate, is widely used in rubber reclaiming. It is also used in synthetic rubber compounding.

All the chemical materials listed at right, and many more, are the result of Hercules' constant research and wide knowledge of rubber chemistry. For specific information on any of these materials, or for advice on how Hercules research can complement yours, mail the coupon today.

*Reg. U. S. Pat. Off. by Hercules Powder Company

Hercules chemical materials for the rubber industry include:

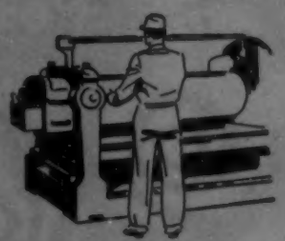
Solvenol*...
A strong solvent for rubber, with a slow rate of evaporation. Widely used in rubber reclaiming.

Staybelite* Esters...
Low-cost tackifiers, compatible with all synthetic rubbers. Valuable in pressure-sensitive adhesives.

Chemical Cotton...
Basis for the toughest high-tenacity rayon for automobile tires, hose, belting, and other rubber products.

Dresinate* 731...
One of Hercules' many resin derivatives, Dresinate 731 is the emulsifying agent used to make GR-S-10.

Nitrocellulose...
Hercules nitrocellulose and ethyl cellulose provide lacquers of maximum adhesion, durability, gloss, and color.



Staybelite* Resins...
Odorless, non-staining softeners for natural rubber.

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HEMICAL MATERIALS FOR
HE RUBBER INDUSTRY

HERCULES POWDER COMPANY
INCORPORATED
918 Market Street, Wilmington 99, Delaware

Please send information on_____

_____

Name_____

Title_____

Company_____

Street_____

City_____ Zone____ State_____

R-63

"There Isn't Any Santa Claus"

SKELLYSOLVE Quality Can't Be Bought at a Lower Price

Would you expect to buy a Cadillac at Chevrolet prices? Certainly not, and just as logically, you wouldn't expect to get Skellysolve quality, Skellysolve dependability, and Skellysolve service in lower priced naphthas.

Whenever you encounter a naphtha claimed to be "as good as" or "better than" Skellysolve, but which is offered at a lower price, ask yourself: "Can I be certain of its quality and purity? Will it do the job effectively and economically? Can I count on rapid delivery and good service on all orders? Can its supplier help me out in a pinch? If its dependability, quality, and service are just as satisfactory as Skellysolve, why is it necessary for this other solvent to be offered on a 'cut price' basis? Will the supply be dependable year after year? Can I be sure of a uniform product? Will this 'cut price' solvent be available a year or two from now? If I do not obtain prompt delivery or if inferior material is received, how much will it cost in my operating results and how much will it embarrass my shipping schedules?" There isn't any question about the quality, dependability, and service of Skellysolve, because its record for the past 16 years proves its excellence. What's more, Skelly is constantly expanding its facilities in order to produce more Skellysolve as the demand grows.

Remember—Skelly Oil Company was the first large volume producer of hexane, heptane, and octane type solvents, and has faithfully served the rubber, oil and fat, ink, lacquer, and other industries with dependable Skellysolve during all these years.

SKELLY

SKELLYSOLVE

SOLVENTS DIVISION, SKELLY OIL COMPANY

SKELLY BLDG., KANSAS CITY, MISSOURI

Get these properties in your Vinyl Compounds

1. Permanent Plasticity
2. Flexibility at Low Temperatures
3. Stability at High Temperatures
4. Non-Extractability by oils, fats, waters, and aliphatic hydrocarbons
5. Non-Migratability
6. Freedom from Odor and Taste
7. Resistance to Weathering

-plasticize with PARAPLEX G-25

Where service requirements for vinyl compounds are toughest, you'll want the outstanding permanence, non-migratability and ultraviolet resistance of Paraplex G-25. Coated fabrics, upholstery, simulated leather, luggage and free films are but a few of the many uses for this unique resinous plasticizer.

For use with vinyl latices, Emulsion G-25, a water dispersion of Paraplex G-25, displays the same properties as Paraplex G-25.

Let our technical staff show you how you can use these unique resinous materials to advantage.

PARAPLEX *is a trademark, Reg. U. S. Pat. Off.*

THE RUBBER CHEMICALS DEPARTMENT

THE RESINOUS PRODUCTS & CHEMICAL COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

For Cooler-Running Tires...
Compound GR-S-10 *with* RED LEAD

Here's how you can take full advantage of GR-S-10, the new rubber with improved tack for your tires.

Use #2 RM Red Lead in combination with thiazole and thiuram accelerators. The result is a safer, cooler running tire of improved heat stability. In addition the #2 RM Red Lead assures a practical rate of cure and an extended curing range.

It is effective, efficient and economical.

Two formulas are shown. The accompanying data indicate how the addition of #2 RM Red Lead in Formula "B" helps produce cooler-running, safer tires... tires that last longer, and whose superior balance of original properties is well maintained throughout their service life.

Further information will be supplied upon request to the Rubber Division of our Research Laboratories, 105 York Street, Brooklyn, N. Y.

COMPOUND GR-S-10 WITH RED LEAD FOR THESE 6 GOOD REASONS:

1. Improved Heat Stability —retention of elasticity
2. Lower Heat Build-up — Cooler Running
3. Faster Curing Rate
4. Extended Curing Range
5. Excellent General Physical Properties
6. Safe Processing

FORMULAS

GR-S-10 TREAD STOCK

	"A"	"B"
GR-S-10	100	100
EPC Black	45	45
Zinc Oxide	3.0	3.0
#2 RM Red Lead	—	2.25
Santocure	1.80	—
Thiofide	—	0.65
Thionex	—	0.25
Sulfur	2.00	1.40
Disproportionated Wood Rosin	—	5
Coal Tar Softener	8	3

DATA

Sample	*T/287°F*	*Tensile Strength*	*% Elong.*	*M-300*	*M-500*	*Shore*	*△ T, F°1*
A	15	no cure					
	20	270	890	0	80	40	
	30	2490	710	600	1500	51	
	45	3000	635	800	1990	55	66.5
	60	2600	580	875	2200	56	64.0
	90	2500	570	920	2140	56	64.0
B	15	2600	870	240	915	50	
	20	2980	790	415	1290	52	
	30	3170	680	710	1800	56	
	45	3110	630	885	2215	57	63.0
	60	3170	630	880	2190	57	60.5
	90	3000	585	930	2350	57	60.5
		Aged 48 Hr. at 100°C					
A	15	no cure					
	20	insufficient cure					
	30	1600	240	....	....	69	
	45	2060	335	1980	....	68	
	60	2000	340	1700	....	67	
	90	2200	370	1685	....	67	
B	15	2520	395	1730	....	66	
	20	2800	475	1550	....	65	
	30	2725	465	1620	....	65	
	45	2700	450	1660	....	65	
	60	2780	450	1660	....	65	
	90	2620	430	1530	....		

[1]*Goodrich Flexometer at 20°C, Load 100 psi, Stroke, 20%*

NATIONAL LEAD COMPANY

New York 6; Buffalo 3; Chicago 80; Cincinnati 3; Cleveland 13; St. Louis 1; San Francisco 10; Boston 6, (National Lead Co. of Mass.); Philadelphia 7, (John T. Lewis & Bros. Co.); Pittsburgh 30, (National Lead Co. of Pa.).

Go Ahead with High Loadings
...USE WITCO SOFTENERS

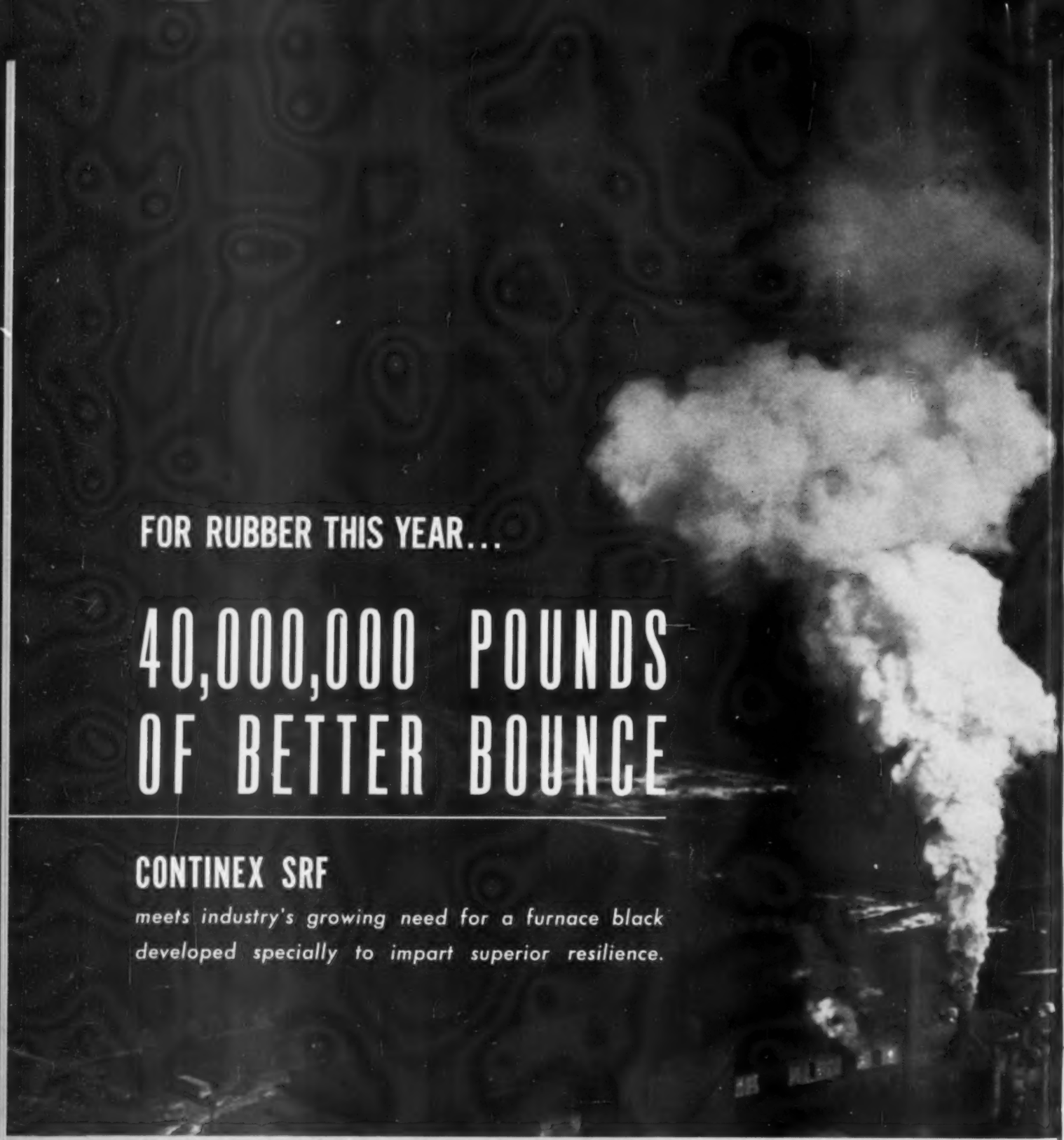
It's the green light for high loadings when you use Witco Softener #20. The plasticizing and lubrication of stiff, heavily loaded stocks with Witco Softener #20 reduces milling time, permits lower milling temperatures, improves dispersion of carbon black and other pigments and, at the same time, does not materially alter the rate of cure. Witco Softener #9 provides stocks with slightly higher tensile strength and tear resistance than is obtainable with ordinary softeners and still maintains good plasticization and pigment dispersion.

WITCO CHEMICAL COMPANY

MANUFACTURERS AND EXPORTERS

295 MADISON AVENUE · NEW YORK 17, N. Y.

Boston · Chicago · Detroit · Cleveland · Akron · London



FOR RUBBER THIS YEAR...

40,000,000 POUNDS OF BETTER BOUNCE

CONTINEX SRF

meets industry's growing need for a furnace black developed specially to impart superior resilience.

● The Continental Carbon Company's facilities at Sunray, Texas, shown above, insure a dependable supply of both furnace and channel blacks produced under rigidly controlled conditions. This assures the rubber manufacturer of uniform quality and makes certain the finished rubber product will possess the correct properties to provide maximum service in the application for which it is intended.

CONTINENTAL CARBON COMPANY
MANUFACTURER

WITCO CHEMICAL COMPANY
DISTRIBUTOR AND EXPORTER
CONTINENTAL CHANNEL AND FURNACE BLACKS
295 MADISON AVENUE, NEW YORK 17, N. Y.
Boston • Chicago • Cleveland • Akron • Detroit • London

Do you manufacture "chance rubber" products?

If you do, you're probably not aware of it. But you can't afford not to be... and with Perbunan you can eliminate any "Chance" in your products!

Perbunan's versatility and quality are shown in this comparison of Perbunan 18 and 26 in a recipe for services requiring a combination of good low-temperature properties and good aging in oils at high temperatures.

Perbunan is designed in different types for different jobs. You can choose the proper Perbunan for the application. The service dictates the polymer, but Perbunan represents high quality!

Stanco rubber technologists are anxious to help with your problems. Get in touch with the office nearest you.

PERBUNAN
REG. U. S. PAT. OFF.

THE SYNTHETIC RUBBER THAT RESISTS OIL, COLD, HEAT AND TIME

STANCO DISTRIBUTORS, INC., 26 Broadway, New York 4, N.Y.; First Central Tower, 106 South Main Street, Akron 8, Ohio; 221 North La Salle St., Chicago 1, Illinois. West Coast Representatives — H. M. Royal Inc., 4814 Loma Vista Avenue, Los Angeles 11, California. Warehouse stocks in Elizabeth, New Jersey; Los Angeles, California; Chicago, Illinois; Akron, Ohio; and Baton Rouge, Louisiana.

Copyright 1946 by Stanco Distributors, Inc.

BASE RECIPE

Perbunan	100.0
Zinc Oxide	5.0
Stearic Acid	0.5
Semireinforcing Furnace Black	75.0
Santocure	3.0
Tetramethylthiuram disulfide	3.0
Tributoxyethyl phosphate	10.0

PERBUNAN COMPOUND	8975-1 Perbunan 18	8975-2 Perbunan 26
Original Physical Properties		
Cured 60 minutes at 287 F		
Shore Hardness	50	51
Tensile, psi	1800	1950
Elongation, per cent	500	510
Modulus at 300 per cent Elongation, psi	1160	1265
Compression Set 30 per cent Constant Deflection		
70 hr at 212 F, per cent	14	15
70 hr at 250 F, per cent	26	25
High Temperature Oil Aging		
ASTM Test Oil Number One		
70 hr at 300 F		
Shore Hardness change	+2	+7
Volume change, per cent	−2	−7
Tensile, psi	2340	3020
Elongation, per cent	350	420
ASTM Test Oil Number Three		
70 hr at 300 F		
Shore Hardness change	−21	−10
Volume change, per cent	+42	+16
Tensile, psi	1080	1750
Elongation, per cent	300	335
Low Temperature Flexibility		
ASTM Bend Test D736-43T		
Passed at, degrees F	−70	−60

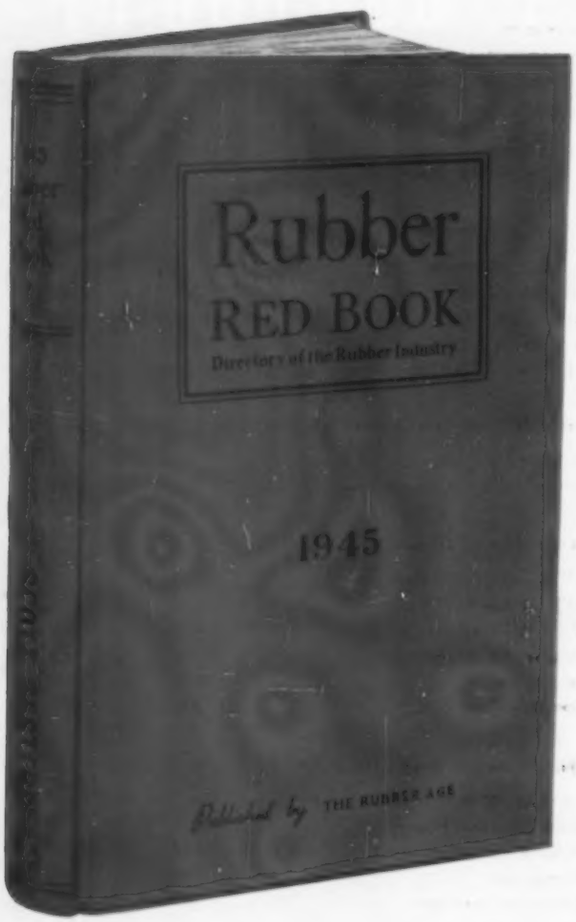
NOW AVAILABLE!

1945 Rubber Red Book

Directory of the Rubber Industry

The current edition is the largest issue ever published—696 pages—and contains the latest available data up to time of going to press. Thousands of changes and additions were made since the previous edition to bring every section up to date.

Copies have already been distributed to every rubber factory in the United States and to those who placed advance orders.



Summary of Contents

Rubber Manufacturers in the United States—Alphabetical and Geographical Sections; Classified List of Rubber Products.

Rubber Manufacturers in Canada

Rubber Machinery and Equipment—Classified List and Addresses.

Accessories and Fittings—Classified List and Addresses.

Rubber Chemicals and Compounding Materials—Classified List and Addresses; Trade and Brand Names.

Fabrics and Textiles—Classified List and Addresses.

Crude Rubber and Related Materials—Classified List and Addresses.

Synthetic Rubber and Other Rubber-Like Materials

Reclaimed Rubber—Manufacturers and Addresses; Rubber Reclaimers Ass'n. "Scrap Rubber Specifications."

Scrap Rubber Dealers

Rubber Latex—Latex and Latex Compounds; Water Dispersions; Miscellaneous Processes; Latex Compounding Materials; Latex Machinery and Equipment.

Rubber Derivatives

Miscellaneous Products and Services

Consulting Technologists

Manufacturer's Sales Agents, Branch Offices, etc.

Technical Journals

Trade and Technical Organizations

Who's Who in the Rubber Industry

Subject Index

Suppliers and all others who want copies of this indispensable directory are urged to place their orders immediately as the supply is extremely limited.

PRICE (Postpaid) — $5.00

(Add 1% for Copies mailed to N. Y. City)

RUBBER AGE

250 W. 57th St., New York 19, N. Y.

Considerable

experience has accumulated in the use of these 2 rubber pigments

A considerable amount of actual plant experience has been gained in the use of Calcene T and Silene EF since these two compounding agents were introduced to the rubber industry. If you have not yet explored the interesting possibilities these two pigments offer your products, you should write today for information and free, working samples.

CALCENE T

Calcene T—A specially prepared, coated, precipitated calcium-carbonate product of extremely fine particle size—confers high tensile strength, resistance to tear and abrasion, low modulus, smooth, fast extrusion and good general processing properties to rubber stocks. A pigment of wide utility.

SILENE EF

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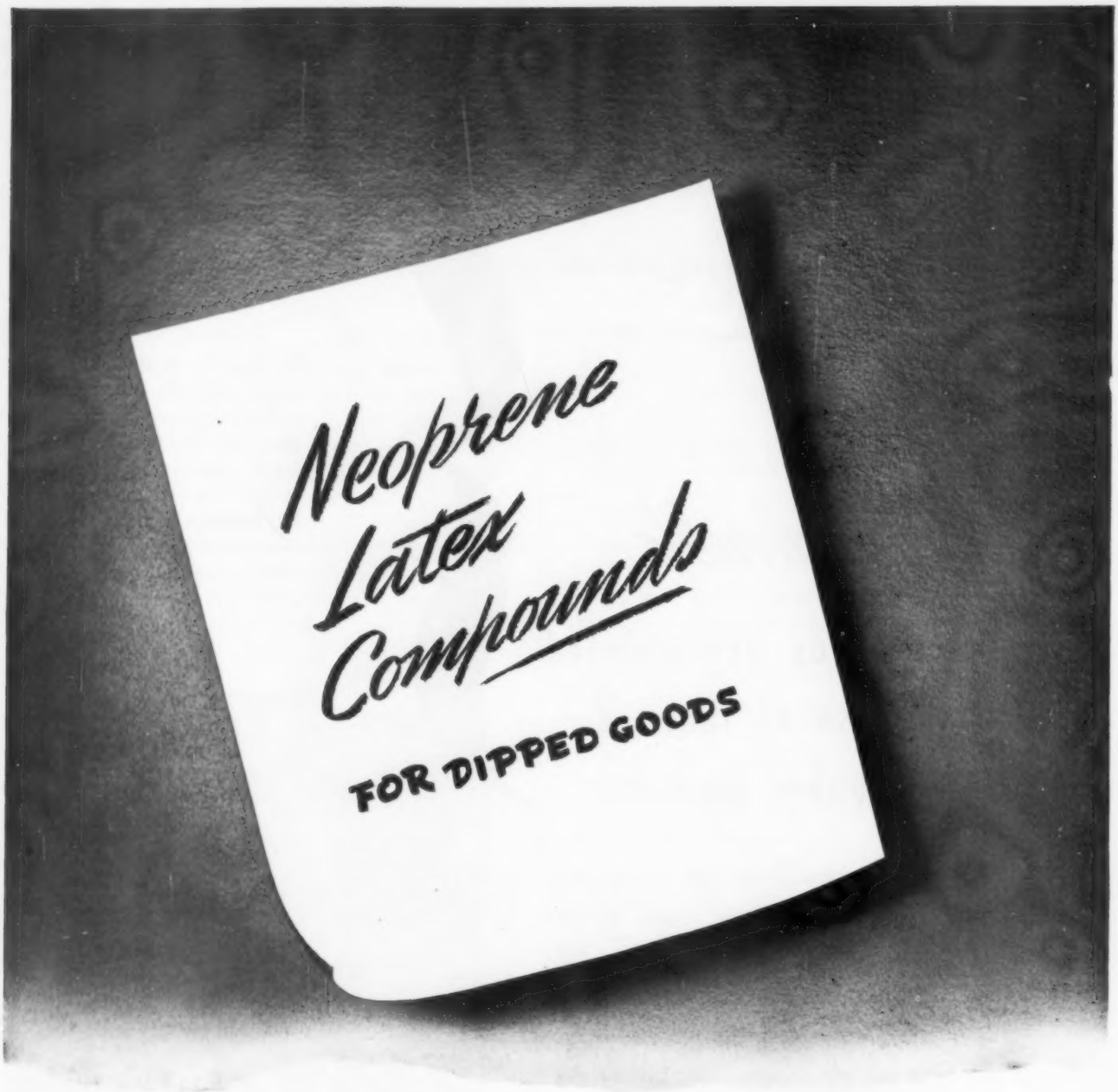

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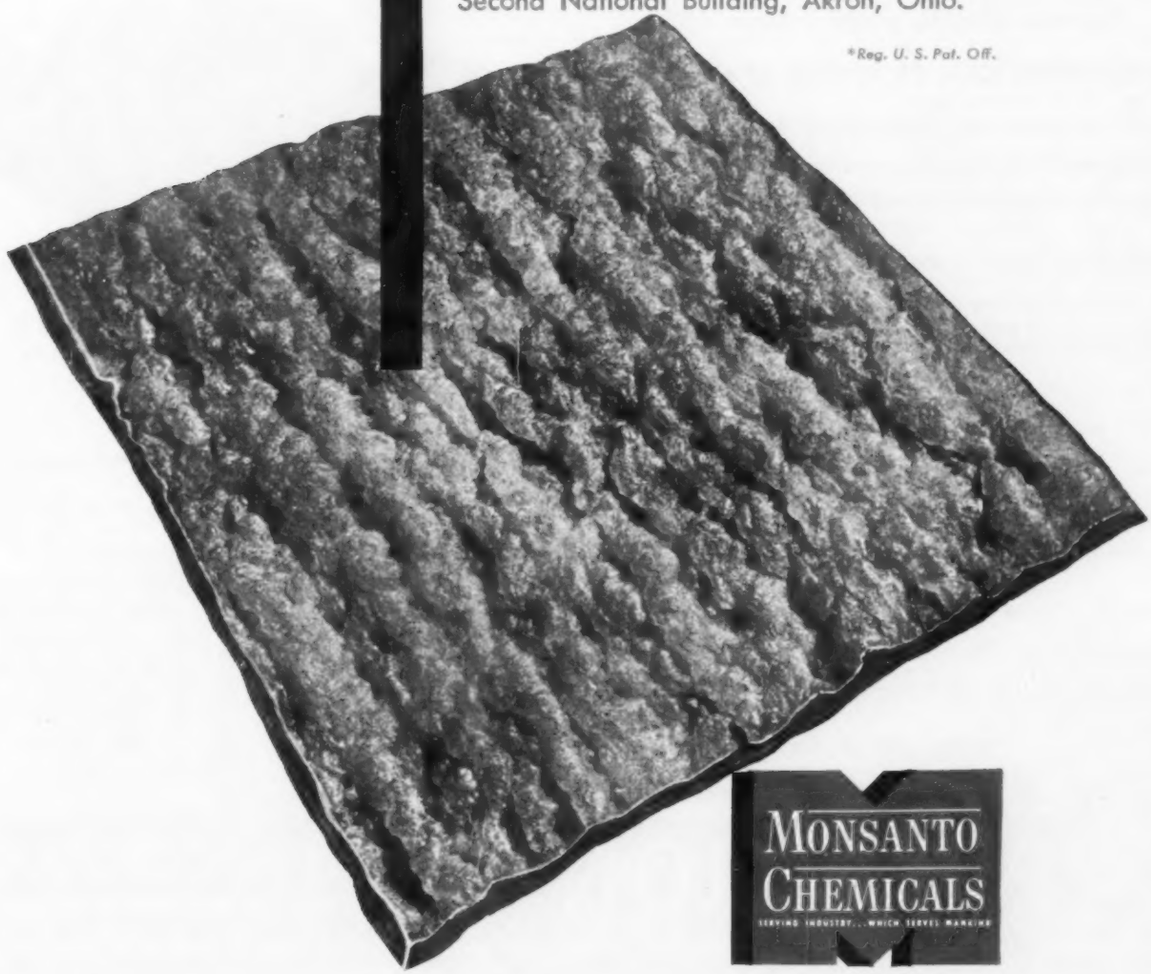
*Reg. U. S. Pat. Off.



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The above illustration shows an enlarged view of the tested specimen area.

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See article "Tread Cracking of Natural and Synthetic Rubber Stocks," by I. B. Prettyman, which appeared on page 29, of the January, 1944, issue of INDUSTRIAL & ENGINEERING CHEMISTRY, or send for Reprint No. 102.

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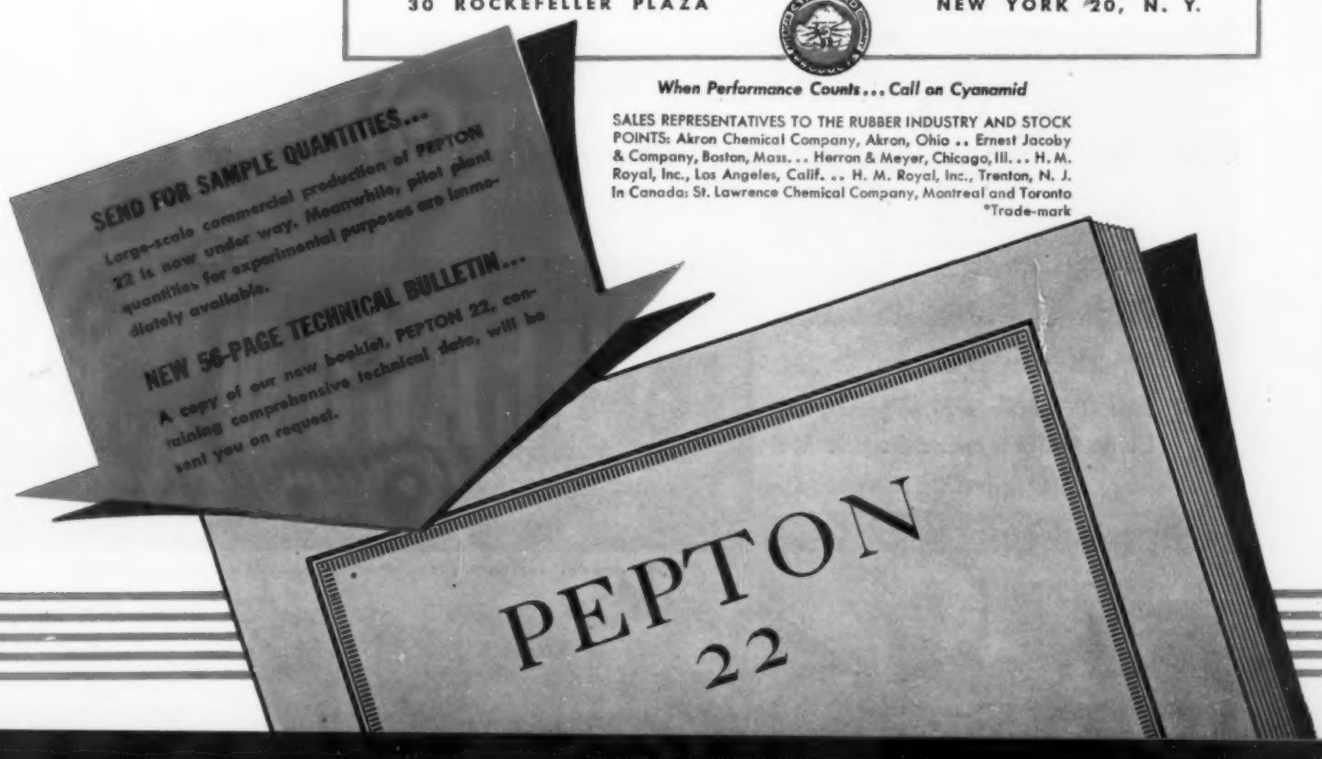
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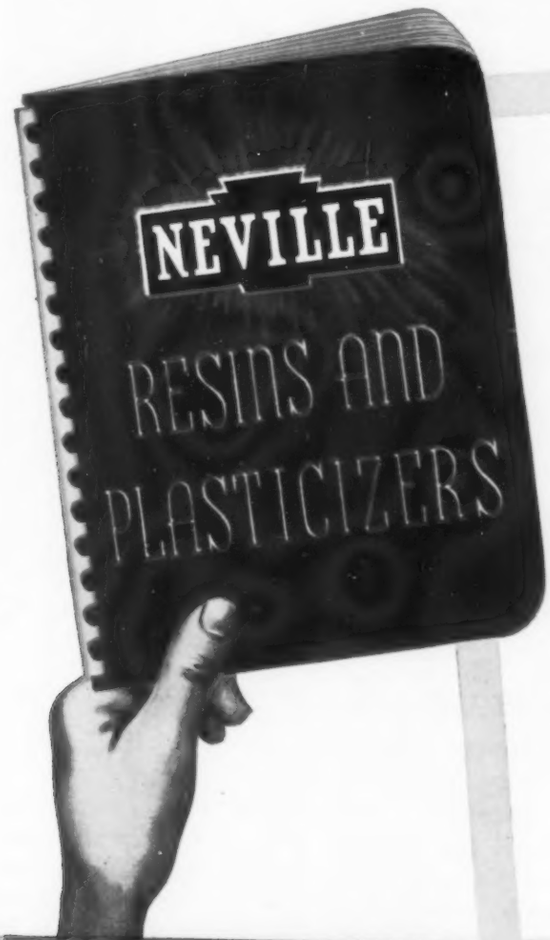

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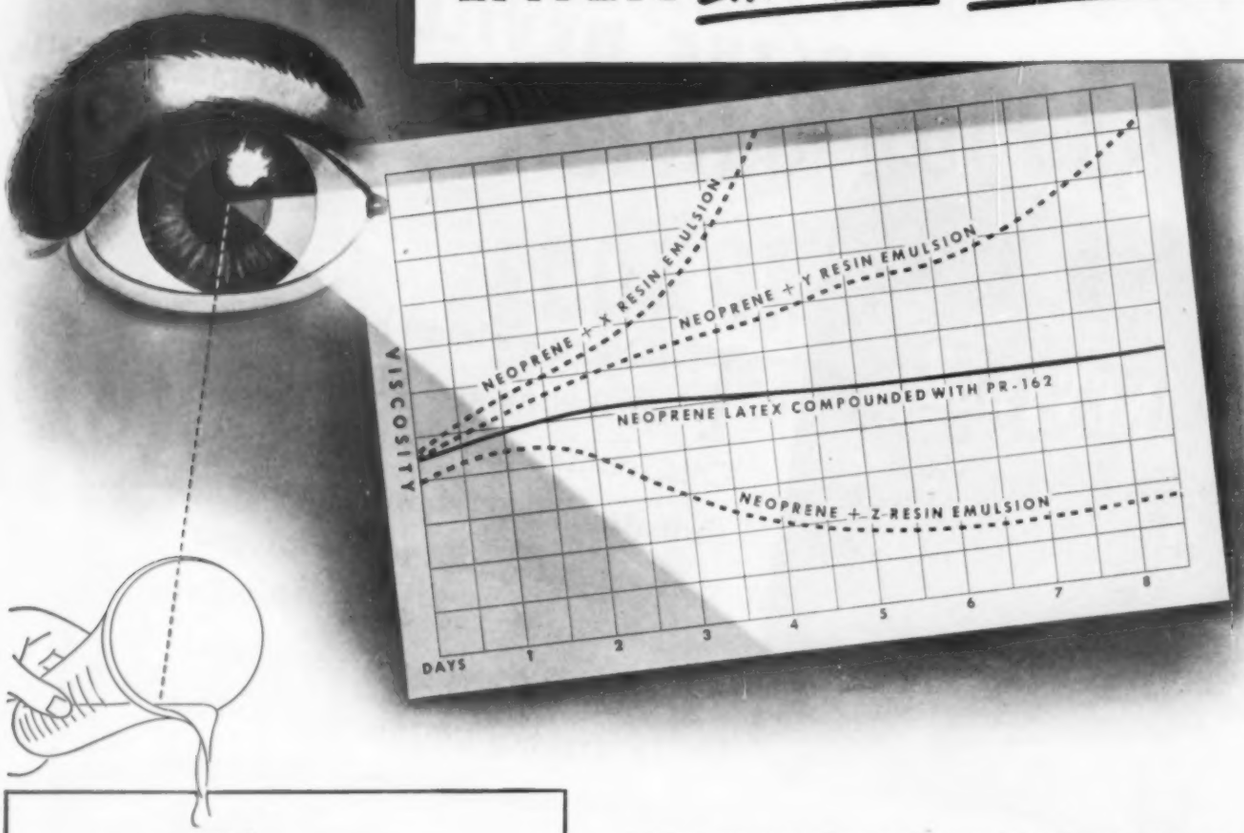

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TESTS SHOW UBS FORMULATION PR-162 GIVES MORE UNIFORM AND CONSTANT VISCOSITY

As the above graph illustrates, many Extender-Tackifier dispersions, when compounded with Neoprene Latex, show unstable viscosity tendencies as compared with UBS formulation PR-162. Users find the more uniform and constant viscosity of PR-162 an extremely important advantage in compounding Neoprene Latices.

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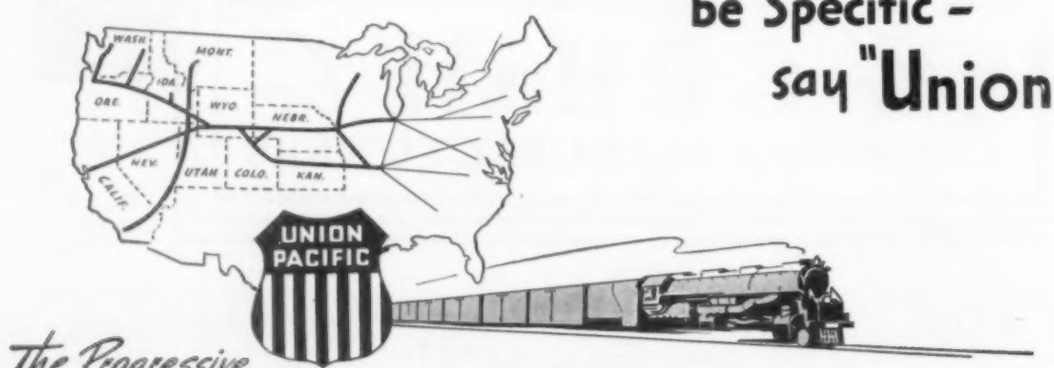

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Technical Bulletin No. 22 — on the Compounding of GR-S with Substantial Loadings of Zinc Oxide

GR-S and GR-S-10 with 100 Parts of Zinc Oxide

"Santocure" Benzothiazyldisulfide Acceleration

ORIGINAL RESULTS

Time of Cure Min. at 45 Lb.	Tensile Strength (psi)	Per Cent Elongation	Modulus Load (psi) for Elongation of: 200%	300%	400%	500%	Permanent Set	Shore Hardness	Tear Resistance Tested at: Room Temp.	100°C.
GR-S										
7.5	1195	820	125	165	250	290	.35	40	66	38
15	1870	650	205	285	450	690	.33	50	62	33
30	1460	595	230	310	460	770	.28	50	62	29
45	1515	590	235	310	465	775	.27	50	59	28
60	1360	590	235	310	425	740	.25	50	62	25
90	1490	620	195	275	430	625	.27	50	59	28
GR-S-10										
30	2240	930	160	240	320	400	.36	40	75	38
45	1280	695	200	280	360	520	.22	43	77	34
60	1680	745	200	280	400	520	.28	45	71	34
90	1510	690	200	275	395	555	.21	45	70	32
120	1530	730	240	285	360	525	.24	45	74	33

Time of Cure Min. at 45 Lb.	Goodyear-Healey Pendulum: Indentation in mm.	Per Cent Rebound	Shore Hardness	Compression Fatigue (Goodrich Flexometer)*: Per Cent Initial Comp.	Running Time and Per Cent Permanent Set	Max. Temp. Rise °C.	Dynamic Compression: Initial	Final	Cut-Growth Resistance Tested at 70° C. Inches Failure: 100 Cyc.	1,200 Cyc.
GR-S										
90	7.92	62.5	50	27.7	40'-38.7	106.5† (at 15'-50.5)	17.4	42.9	.14	.65
GR-S-10										
120	7.94	52.8	44	35.1	B.O.†-30'	106.5† (at 15'-64.0)	23.9	48.5	.03	.21

* Test Conditions: 143 Lb. Load. 0.175" Stroke. 100° C. Oven Temp. † Blow Out.

IN THE reports on the German Tire Industry some rather unusual accelerator combinations were noted in carcass stock formulations. "Vulcacit AZ," which is said to be similar in action to "Santocure," was widely used, and in one case it was employed with Benzothiazyldisulfide. German compounding practice called for 20-50 parts of Zinc Oxide on the polymer in truck tire carcass stocks. Using the German acceleration and sulfur ratios, the following results were obtained with 100 parts of Zinc Oxide. The compounds are interesting in that flat-curing stocks are obtained, which show a definite reversion tendency in the case of GR-S. The pendulum rebound and heat generation could probably be improved by increasing the sulfur content. In the case of slower-curing GR-S-10, an increase in the acceleration and sulfur content is indicated which would probably result in a substantial improvement in heat generating properties.

COMPOUND No. 22		
GR-S	100.0	
GR-S-10 (Rosin Soap Polymer)		100.0
Sulfur	2.37	2.37
Santocure	0.84	0.84
Benzothiazyldisulfide	0.31	0.31
Coumarone-indene Resin	7.5	3.0
E. L. C. Magnesia	5.0	5.0
Zinc Oxide	100.0	100.0

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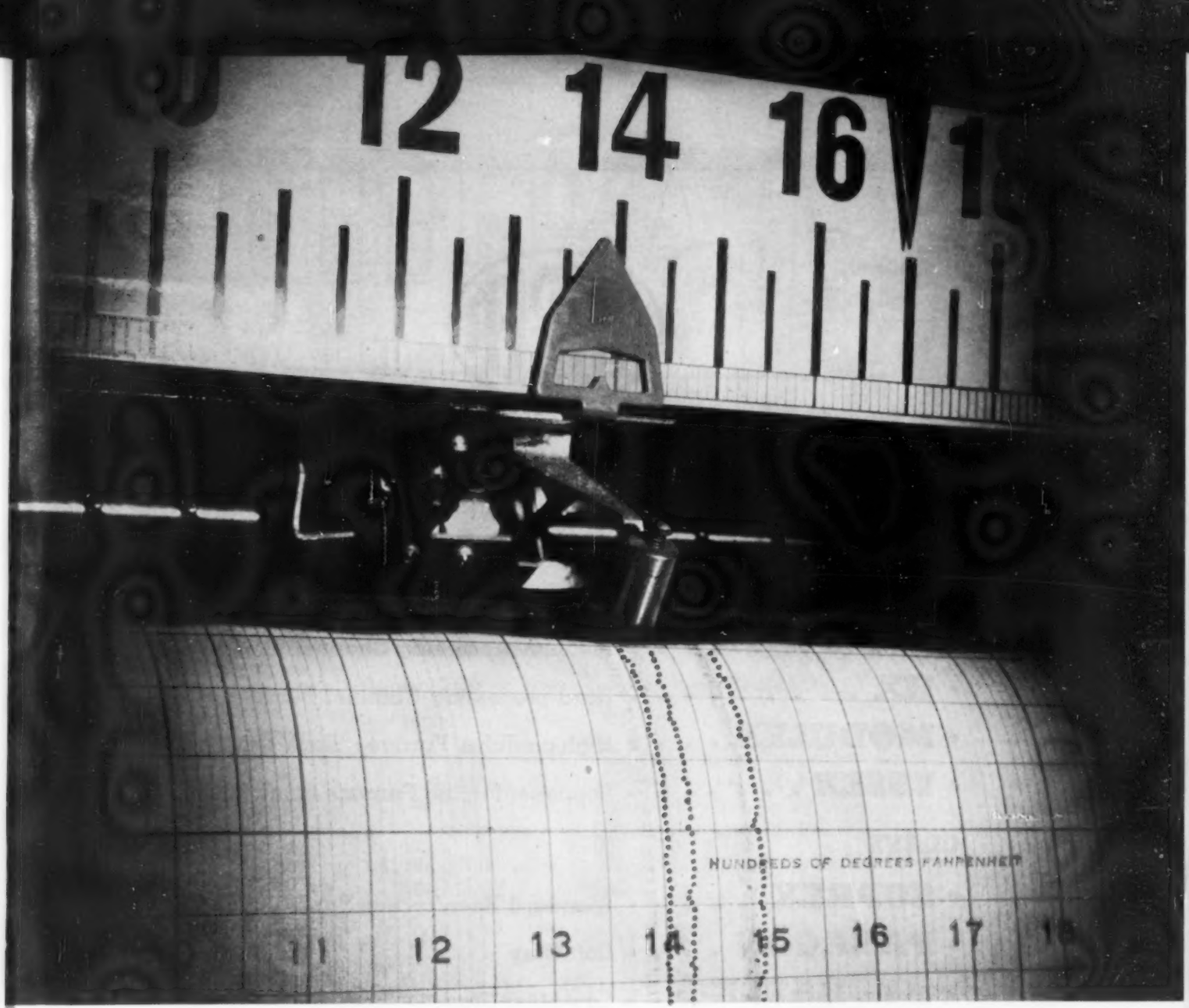

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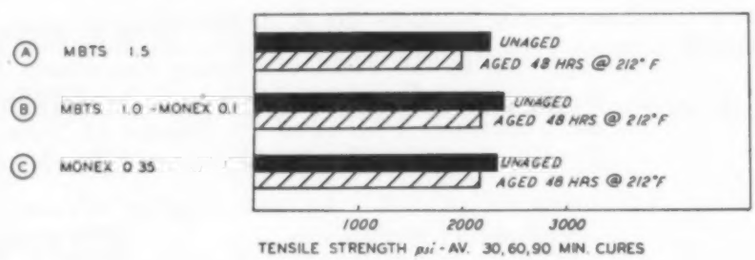

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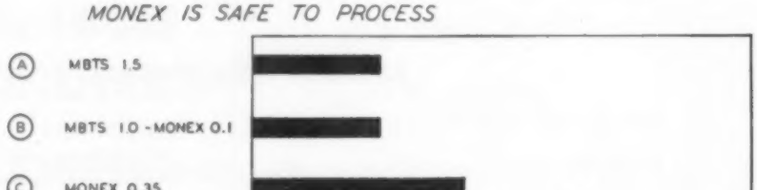

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RUBBER AGE

VOL. 59, No. 3 JUNE, 1946

Swelling of Rubber

II—A Comparison of the Swelling Behaviour of Vulcanized Natural Rubber and GR-S in Organic Liquids

By FRITZ S. ROSTLER, KATHLEEN S. ROSTLER, RACHEL E. MORRISON and RICHARD M. WHITE

Engineering Experiment Station, University of Delaware, Newark, Delaware

IN A previous investigation carried out in this laboratory *(1)*, the swelling of a smoked sheets and a GR-S compound in a limited number of liquids was tested, and certain conclusions were made with regard to the possible application of the test results to reclaiming of mixed scrap rubber. The results of this previous investigation appeared promising enough to warrant an extension of the study to a greater number of liquids.

The main purpose of this article is to contribute experimental data which are lacking in the literature. There are especially lacking data comparing the swelling of Buna S and natural rubber. The object of this investigation was to fill this gap by testing the swelling behaviour of two compounds differing only in rubber hydrocarbons in a number of organic liquids.

Theories and Literature on Swelling

The phenomenon of swelling of rubber and other high polymer substances has attracted many investigators, and the literature and the views on the subject are quite extensive. It would be far beyond the scope of this article to scrutinize the complete literature or even to list all publications which have enriched our knowledge on the subject. A brief review of the present status of knowledge and listing of the references most pertinent to the present investigation will have to suffice.

Four more or less distinct approaches to explain swelling can be discerned in the literature. One approach has been fundamentally a qualitative one. Many investigators measured the swelling of natural rubber compounds in a variety of liquids for specific practical purposes. Experimental data resulting from this type of work up to 1934 have been sorted and reported by Dawson and Porritt *(2)*. Very few data, scattered throughout the literature, are reported on Buna S.

The second way of approaching the problem has been systematic measuring and recording of experimental data with the aim of detecting general characteristics of swelling behaviour. Representative of investigators using the second approach are especially Scott *(3* to *10)* and Whitby *(11, 12)*. Scott's "time-swelling curve" and his definition of "maximum swelling" and "swelling increment" are the most important contributions to orderly examination of swelling *(3)*. Scott's time-swelling curve consists of two portions, the first portion steeply curved and characteristic of the rapid swelling to an initial saturation, and the second portion straight and expressing the slow continuous increase in swelling which Scott attributes to oxidation, and which he terms the "swelling increment." Scott also reported in this fundamental paper on swelling the influence of the nature of the swelling liquid, of compounding ingredients, of the state of cure, and of other basic characteristics of natural rubber compounds.

Whitby, Evans, and Pasternack *(12)* supplied the most complete data available in the literature on the swelling of natural rubber in various liquids. From their work derived the first correlation of the swelling of rubber with the structure of the swelling liquids which was well substantiated by comparable experimental measurements. These investigators summarize their observations by saying that "the ability of liquids to swell rubber implies that such liquids are not too remote in type from rubber hydrocarbon" and "that the swelling of an organic colloid, such as rubber, is basically a process analogous to the solution of a crystalline substance." This statement summarizes, as will be shown later, all the existing basic concepts of the swelling process.

The third type of approach has consisted of experiments in the field of molecular structure and interpretation of the experimental data by depicting visually the mechanism of swelling. Representative of this approach is the work of Meyer, Mark and Hauser.

Meyer and Mark *(13)* and Fikentscher and Mark *(14)* presented the first model of the rubber structure, where curled long chain molecules are held to each other by van der Waal forces. In a more recent publication *(15)* Mark describes the magnitude of the forces involved in this fundamental architecture of rubber and high polymers in general. Swelling is visualized as a penetration of the swelling agent into the spaces between the entangled spirals of the rubber lattice, where it saturates the residual valences of the double bonds, causing stretching of the chains. The sulfur bridges in vulcanized rubber are thought responsible for retaining the shape of swollen rubber. Hauser *(16)* agrees with Mark, that in the swelling of rubber in liquids solvent molecules enter the parcels of the rubber micelles, expanding them without destroying the structure, and termed this mechanism a "topochemical reaction."

Hauser *(16)* as early as 1929 depicted rubber itself as a solid substance "beta rubber"* swollen by a liquid "alpha rubber,"* the proportions depending on the history of the sample, such as milling.**

A picture of the swelling mechanism in general, which is in accordance with the views on rubber, emphasizing the importance of consideration of structure, has been more recently given by Ott *(17)* in a lecture on "Effect of Chain Lengths on Physical Properties of Cellulose Derivatives."

The fourth type of approach has been mathematical treatment of experimental results with the aim of establishing quantitative relationships, and of developing graphs or formulas useful for predicting the behaviour to be expected in experiments.

The first attempt made in this line was by Ostwald *(18)*, who correlated swelling with the dielectric constant of the swelling liquid,† and, in later work, suggested the dielectric polarization. An investigation based on Ostwald's work in which the swelling capacity of mixtures of liquids was correlated with the dielectric polarization has been reported by Ermolenko and Levina *(19)*.

More recent investigations with the mathematical

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* Hauser (l. c.) suggested replacing the terms "sol" and "gel" by "alpha rubber" for the ether-soluble portion, and "beta rubber" for the ether-insoluble portion.

** This fact, well recognized today by rubber chemists, explains some of the differences in swelling data found by different investigators and gives rise to the necessity of correlating quantitatively only data collected on identical rubber samples and under identical swelling conditions.

† Ostwald's formula $D^n V/S = \text{Const.}$, where n is a value between 2 and 3, D, the dielectric constant of the liquid, and S, the swelling, has frequently been misquoted as $nV/SD = \text{Const.}$

TABLE I

Liquid No.	Designation	Rubber	Sample No.	% Swelling at 25° C. 24 hours: Measured Value	24 hours: % Deviation from Mean Value	48 hours: Measured Value	48 hours: % Deviation from Mean Value	72 hours: Measured Value	72 hours: % Deviation from Mean Value	168 hours: Measured Value	168 hours: % Deviation from Mean Value
14	Benzene	GR-S	1	290	1	306	5	287	1	290	0
			2	292	2	278	5	291	0	297	3
			3	292	2	310	6	300	3	304	5
			4	285	1	287	2	271	6	281	3
			5	284	1	300	3	298	3	304	5
			6	279	3	287	2	279	4	265	8
			7	293	2	278	5	296	2	284	2
			8	278	3	286	2	302	4	289	0
			Average	287	2	292	4	290	3	289	3
14	Benzene	Smoked Sheets	1	205	0	222	2	234	1	223	1
			2	210	3	217	0	235	1	234	4
			3	212	4	227	4	230	1	237	5
			4	210	3	237	9	239	3	237	5
			5	195	4	236	9	227	2	214	5
			6	203	0	214	2	231	0	216	4
			7	206	1	204	7	230	1	221	2
			8	195	4	190	13	231	0	222	1
			Average	204	2	218	6	232	1	225	3
2	n-Heptane	GR-S	1	99	1	91	3	99	4	82	5
			2	100	2	93	6	104	9	89	3
			3	100	2	92	4	103	8	89	3
			4	100	2	83	6	97	2	90	5
			5	94	4	83	6	92	3	83	3
			6	95	3	87	1	85	11	83	3
			7	100	2	87	1	88	7	91	6
			8	98	0	91	3	95	0	84	2
			Average	98	2	88	4	95	5	86	4
2	n-Heptane	Smoked Sheets	1	136	2	127	1	145	1	136	2
			2	135	3	136	8	150	5	127	5
			3	141	1	125	1	150	5	141	6
			4	143	3	128	1	146	2	134	1
			5	139	0	113	10	134	6	134	1
			6	137	1	128	1	134	6	128	4
			7	138	1	120	5	141	1	139	5
			8	144	4	133	6	144	1	127	5
			Average	139	2	126	4	143	3	133	3

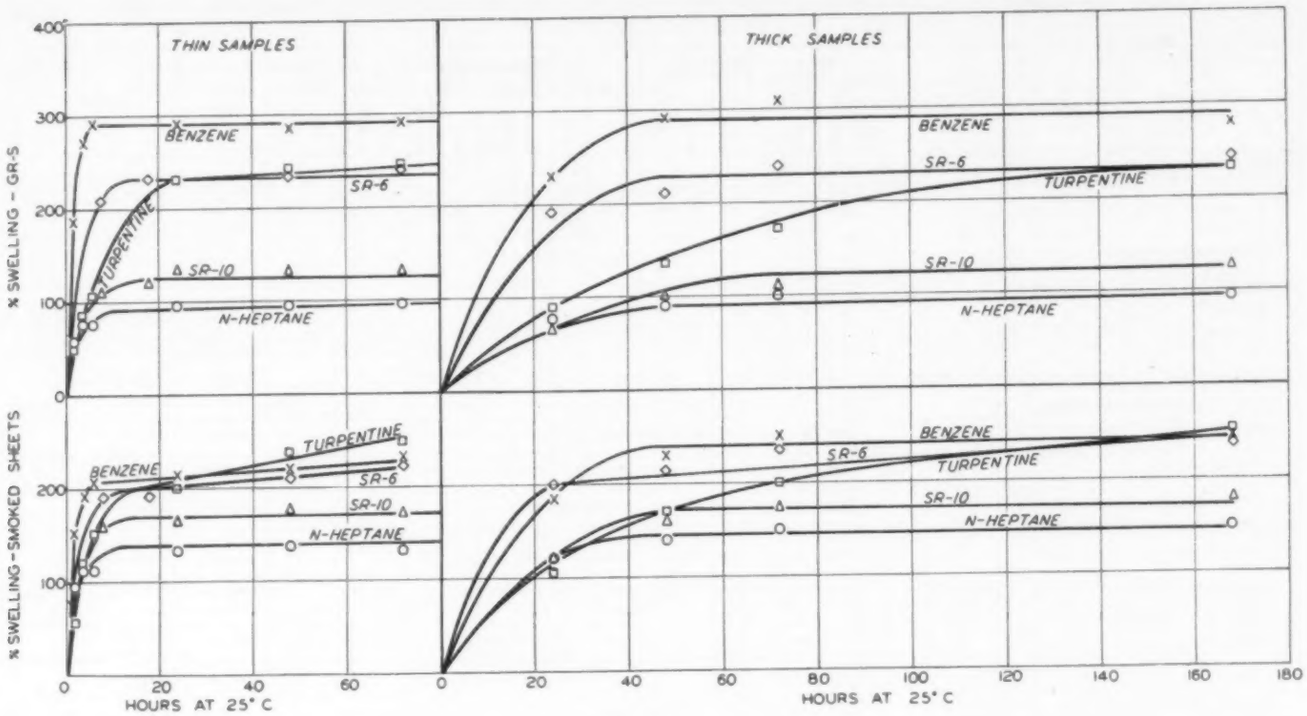


Figure 1.

approach have been carried out by Gee and co-workers *(20* to *25)* and by Flory and co-workers *(26)*. Gee has developed a theory that the swelling of rubbers is thermodynamically a mixing of two liquids. Gee's theory is based on the concept that the swelling of rubber is brought about by the increase of entropy of mixing. According to Gee's theory, a rubber will swell most in a liquid which has a cohesive energy density (latent heat of evaporation at constant volume in calories per cc.) closest to that of the rubber. Flory and Rehner *(26)* have pointed out that the swelling process is thermodynamically more complicated than the mixing of two liquids. Besides other factors, two opposing entropies have to be considered—the decrease in chain configurational entropy and the increase in entropy of mixing.

The mathematical approach has also been followed in correlating the swelling of oil-resistant rubbers with physical measurements used in the petroleum industry to characterize oils, such as viscosity gravity constant, aniline point, etc. Work has been done in this line principally by Fraser *(27* to *30)* and by Carman, Power and Robinson *(31)* who showed the limits and limitations of these correlations. The main fact to be seen from all investigations dealing with these characteristics is that a simple (straight line) relationship with swelling exists only for narrow groups of related liquids. For narrow groups, however, reliable predictions can be made. It has, for instance, been accepted that the lower the aniline point of a lubricating oil, the higher its swelling power *(32)*.

Summarizing the above discussion, it can be said that all formulas suggested for predicting the swelling of rubber in liquids have the same shortcoming, that, although they give good approximations for a limited range of liquids, when generalized, the exceptions from the rule are at least as frequent as the cases following the rule.

In final analysis, all methods of mathematical treatment of swelling behaviour have the same object, namely to provide a simple formula, which represents the facts the organic chemist expresses in the structural formula. The limited applicability of such formulas can hardly be surprising since the swelling of rubber comprises a multitude of processes, different with each pair of rubber and liquid. The processes themselves involve both chemistry and molecular physics. It is highly improbable that interaction of this complex nature will correlate with one or a few physical constants in a formula of a wide general validity.

Basis and Scope of Investigation

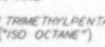
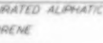
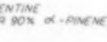
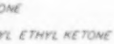
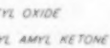
The present investigation is based on the concept that the clearest understanding of the mechanism of swelling and the most reliable prediction of the behaviour of rubbers exposed to liquids can be gained by considering the structures of the rubbers and the liquids, and the possibilities of fitting those structures

TABLE II—EFFECT OF STATE OF CURE OF GR-S ON SWELLING

Liquid No.	Designation	Percent Swelling 24 hrs. 25° C. 30′ Cure at 45#	50′ Cure at 45#	70′ Cure at 45#
2	n-Heptane	115	95	85
8	Diisobutylene *	165	125	120
14	Benzene	370	290	265
31	Turpentine	325	230	220
	60 parts Diisobutylene} ** 40 parts Aromatics}	280	235	205

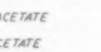
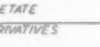
* Reference Fluid SR 10, Stanco Distributors, Inc.
** Reference Fluid SR 6, Stanco Distributors, Inc.

TABLE III—STRUCTURE, PHYSICAL CHARACTERISTICS AND SWELLING DATA ON LIQUIDS TESTED.

DESIGNATION	STRUCTURE	BOILING RANGE °C			VISCOSITY CENTIPOISES		MIXED ANILINE POINT °C	n_D^{25}	SP. GR. 25°/25°	% SWELLING 24 HRS. 25°C				% SWELLING 48 HRS. 60°C				SOURCE OF LIQUID	GRADE
										THIN SAMPLE		THICK SAMPLE		THIN SAMPLE		THICK SAMPLE			
		INITIAL	50%	END	25°C	60°C				GR-S	SMOKED SHEETS	GR-S	SMOKED SHEETS	GR-S	SMOKED SHEETS	GR-S	SMOKED SHEETS		
I. HYDROCARBONS																			
A. SATURATED ALIPHATIC HYDROCARBONS																			
1. N-HEXANE	C-C-C-C-C-C	66	68	69	0.3	0.2	68.5	1.3756	0.68	95	130	85	130	95	130			PHILLIPS	TECHNICAL
2. N-HEPTANE	C-C-C-C-C-C-C	98.4	98.4	98.4	0.4	0.3	69.7	1.3860	0.68	95	140	90	140	95	160	95	155	WESTVACO	PURE
3. N-OCTANE	C-C-C-C-C-C-C-C	124	125.5	126	0.5	0.3	70.5	1.3950	0.70	105	145	70	120	105	150			EASTMAN	SYNTHETIC
4. 2,2,4 TRIMETHYLPENTANE ("ISO OCTANE")		98	99	99	0.5	0.3	74.0	1.3900	0.69	65	125	35	95	60	130			EASTMAN	PURE
B. UNSATURATED ALIPHATIC HYDROCARBONS																			
5. ISOPRENE		32	33	36	0.2		28.0	1.4170	0.68	165	160							PURIFIED IN OUR LAB BY DISTILLATION IN PRESENCE OF B-PHENYL NAPHTHYLAMINE	
6. N-HEXENE-1		59	63	65	0.4		42.3	1.3880	0.68	160	165	145	165					LAB. PREP. FROM $C_4H_9MgBr + CH_2CHCH_2Br$	
7. N-OCTENE-2		124	125	126	0.5		52.4	1.4109	0.72	165	170	135	160					EASTMAN	PURE
8. DIISOBUTYLENE		100	101	101.5	0.5		57.5	1.4080	0.72	125	160	70	120	140	175			STANCO	"REFERENCE FLUID SR-10"
C. SATURATED ALICYCLIC HYDROCARBONS																			
9. CYCLOHEXANE		80	81	81	0.9	0.5	49.0	1.4230	0.77	230	210	135	145					PHILLIPS	TECHNICAL
10. METHYLCYCLOHEXANE		98.5	101	101.5	0.7		54.1	1.4219	0.77	220	195	145	195					EASTMAN	PRACTICAL
11. DECAHYDRONAPHTHALENE		190	192	193	2.4	1.0	48.0	1.4750	0.88	255	245			260	250			EASTMAN	PRACTICAL
D. UNSATURATED ALICYCLIC HYDROCARBONS																			
12. CYCLOHEXENE		82.5	83	83.5	0.6	0.4	26.0	1.4449	0.80	295	240	275	240					EASTMAN	PURE
13. DICYCLOPENTADIENE		152	170	181	4.1	1.8	20.0	1.5090	0.99	245	215			300	270			KOPPERS	TECHNICAL
E. AROMATIC HYDROCARBONS																			
14. BENZENE		80	80	80	0.6	0.4	11.2	1.4999	0.87	290	200	250	195	300	230	305	265	BAKER	PURIFIED 99-100%
15. TOLUENE		109	110.5	111	0.5	0.4	9.1	1.4956	0.86	300	220	230	170	295	260			EASTMAN	PRACTICAL
16. XYLENE		138	140	140	0.6	0.4	10.5	1.4946	0.86	315	235	220	190	300	270			EASTMAN	"NEUTRAL HISTOLOGICAL"
17. MESITYLENE		163	164.5	166	0.7	0.5	16.0	1.4950	0.86	310	240	180	135	315	270			EASTMAN	PURE
18. ETHYLBENZENE		134	136	136	0.6	0.3	10.2	1.4951	0.86	290	210	190	150	300	260			EASTMAN	PURE
19. DIETHYLBENZENE		175	179	181	0.8	0.6	16.0	1.4929	0.86	275	205	150	100	305	310			EASTMAN	META AND PARA MIXTURE TECHNICAL
20. TRIETHYLBENZENE		215	217	219	1.2	0.8	22.6	1.4971	0.87	260	200	75	55	285	245			EASTMAN	TECHNICAL
21. ISOPROPYLBENZENE (CUMENE)		150.5	152.5	153	0.7	0.5	13.5	1.4891	0.86	280	220	170	165	280	245	250	250	EASTMAN	PURE
22. P-CYMENE		176	176	176	0.8		19.2	1.4881	0.86	275	235			515	565*			BAKER	C.P.
23. DIISOPROPYLBENZENE		194	203	206	1.3	0.75	23.0	1.4923	0.86	225	250	110	120	370*	470*	245*	250*	EASTMAN	TECHNICAL 50% M, 40% P, 10% O
24. STYRENE		65/40 mm	65/40 mm	65/40 mm	0.5		10.1	1.5437	0.90	295	215							PURIFIED IN OUR LABORATORY BY DOUBLE DISTILLATION OVER NaOH IN A VACUUM	
25. 1-METHYLNAPHTHALENE		237	242	245	3.0	1.0	17.5	1.6024	1.01	270	185			325	255			EASTMAN	PRACTICAL
26. 1,2-DIMETHYLNAPHTHALENE		260	263	266	4.0	1.5	14.7	1.6030	1.02	245	180			300	230	270	200	EASTMAN	TECHNICAL
F. HYDROCARBONS OF MIXED ALICYCLIC AND AROMATIC CHARACTER																			
27. TETRAHYDRONAPHTHALENE		207	207	207	2.0	1.0	10.2	1.5412	0.97	330	245			490*	425*	395*	380*	DU PONT	EXPERIMENTAL SAMPLE
28. PHENYLCYCLOHEXANE		238	239	240	2.0		13.2	1.5232	0.94	280	230	115	100	335	285			EASTMAN	PURE
G. CYCLIC TERPENE HYDROCARBONS																			
29. DIPENTENE (CONTAINING P-CYMENE)		168	175	177	0.9		34.9	1.4710	0.85	250	230			330*	310*			HERCULES	EXPERIMENTAL SAMPLE
30. D-LIMONENE		175	177	178	0.9		33.7	1.4701	0.84	265	230			265	250			EASTMAN	TECHNICAL
31. TURPENTINE (OVER 90% α-PINENE)		147	155	175	1.3	0.8	45.5	1.4665	0.86	230	200	140	170	450*	485*			HERCULES	"STEAM DISTILLED WOOD TURPENTINE"
II. KETONES																			
32. ACETONE		55	56	57	0.3			1.3570	0.78	35	20							EASTMAN	TECHNICAL
33. METHYL ETHYL KETONE		78	79.5	81	0.5	0.3		1.3790	0.80	95	60							EASTMAN	PRACTICAL
34. METHYL ISOBUTYL KETONE		111	116	117	0.6			1.3949	0.80	105	90	65	40					CARBIDE	
35. MESITYL OXIDE		126	128	130	0.9			1.4421	0.85	145	105							CARBIDE	ANHYDROUS
36. METHYL AMYL KETONE		147	151	154	0.8			1.4080	0.82	170	120	80	70					CARBIDE	
37. CYCLOHEXANONE		154	156	156	2.6	1.0		1.4481	0.95	215	135	90	80					EASTMAN	FROM BISULFITE COMPOUND
38. M-METHYLCYCLOHEXANONE		166	167	168		0.9		1.4445	0.91	235	175			DISINTEGRATED				EASTMAN	PURE
39. P-METHYLCYCLOHEXANONE		169	170	170.5	1.6	0.9		1.4459	0.91	235	175			DISINTEGRATED				EASTMAN	PURE
40. ISOPHORONE		205	215	220				1.4765	0.92	130	100							CARBIDE	

*—DISINTEGRATING

TABLE III (CONTINUED)

DESIGNATION	STRUCTURE	BOILING RANGE °C			VISCOSITY CENTIPOISES		MIXED ANILINE POINT °C	n_D^{25}	SP. GR. 25°/25°	% SWELLING 24 HRS. 25°C THIN SAMPLE		% SWELLING 24 HRS. 25°C THICK SAMPLE		% SWELLING 48 HRS. 60°C THIN SAMPLE		% SWELLING 48 HRS. 60°C THICK SAMPLE		SOURCE OF LIQUID	GRADE
		INITIAL	50 %	END	25°C	60°C				GR-S	SMOKED SHEETS	GR-S	SMOKED SHEETS	GR-S	SMOKED SHEETS	GR-S	SMOKED SHEETS		
III ALCOHOLS																			
41 N-HEXANOL-1	C-C-C-C-C-C-OH	155	158	158	4.0	2.0		1.4196	0.82	5	15			30	60			EASTMAN	PRACTICAL
42 N-OCTANOL-1	C-C-C-C-C-C-C-C-OH	191	194	195	7.0	3.0		1.4271	0.82	5	15							EASTMAN	PURE
43 BENZYL ALCOHOL		204	206	207	5.0			1.5360	1.04	10	5							EASTMAN	CHLORINE FREE
44 DIACETONE ALCOHOL		135	169	170				1.4220	0.94	0	0							CARBIDE	ACETONE FREE
IV ETHERS																			
45 ETHYL ETHER	C-C-O-C-C	34	34.5	35	0.3			1.3509	0.71	135	125							MALLINCKRODT	U.S.P.
46 N-BUTYL ETHER	C-C-C-C-O-C-C-C-C	139	142.5	144	0.6	0.4		1.3980	0.77	170	170							EASTMAN	PRACTICAL
V ESTERS																			
47 ETHYL ACETATE		76	77	77	0.4	0.3		1.3710	0.89	85	60							MALLINCKRODT	ANALYTICAL REAGENT
48 AMYL ACETATE		120	131	142	0.8			1.3960	0.86	115	115							MALLINCKRODT	TECHNICAL
VI CHLORINE DERIVATIVES																			
49 CHLOROFORM		61	61	61	0.5	0.4		1.4430	1.50	435	310	320	240					BAKER	U.S.P.
50 CARBON TETRACHLORIDE		76	77	77	0.9	0.6		1.4580	1.58	375	300	250	240					BAKER	U.S.P.
51 CHLOROBENZENE		130	131.5	132	0.8	0.5		1.5220	1.10	345	235	240	180					EASTMAN	PURE
52 ETHYLENE CHLORIDE	C-C-C-C	83	83.5	84	0.8			1.4420	1.256	180	125							EASTMAN	PURE
VII AMINES																			
53 ANILINE		183	184	185	3.8	1.5		1.5829	1.02	0	0		30	5				BAKER	C.P.
54 TOLUIDINE		201	202	204	3.0	1.4		1.5560	0.98	65	25		125	55				KOPPERS	"REFINED TOLUIDINES"
55 PHENYLETHANOLAMINE		284	285	287				1.5778	1.09	0	0		0	0				CARBIDE	
VIII PYRIDINES																			
56 PYRIDINE		112	115	115	0.9	0.6		1.5072	0.98	210	90							KOPPERS	"REFINED"
57 α-PICOLINE		127	128	129	0.8			1.4980	0.94	235	150							KOPPERS	"REFINED"
58 2,6-LUTIDINE		136	144	145	0.9			1.4960	0.93	215	140							REILLY	
59 QUINOLINE		237	238	239	3.4	1.7		1.6210	1.08	135	65							KOPPERS	
IX SULFUR COMPOUND																			
60 CARBON DISULFIDE	S=C=S	46	46	46.5	0.4			1.6220	1.263	300	250							REDISTILLED IN OUR LABORATORY BEFORE USE	

KEY TO SOURCE OF LIQUIDS IN TABLE III

Baker, J. T. Baker Chemical Co.; Carbide, Carbide & Carbon Chemicals Corp.; du Pont, E. I. du Pont de Nemours & Co., Inc.; Eastman, Eastman Kodak Co.; Hercules, Hercules Powder Co.; Koppers, Koppers Co., Inc.; Mallinckrodt, Mallinckrodt Chemical Works; Phillips, Phillips Petroleum Co.; Reilly, Reilly Tar & Chemical Corp.; Stanco, Stanco Distributors, Inc.; Westvaco, Westvaco Chlorine Products Corp.

together. The structural formula is the best, most complete and condensed expression of a chemical compound, and the models we have of molecular structure of high polymer substances, the best expression of their behaviour. Consequently, correlating swelling behaviour with structure appears to be the most promising and safest way of arriving at simple and reliable rules.

The same methods and test compounds as described in the previous investigation *(1)* were used in this study. The method of measuring the volume of the test specimen by displacement of liquid into a calibrated side tube was found to be rapid, accurate, and more convenient to operate than the A.S.T.M. Method D471-44T or any of the other methods described in the literature. The composition of the test compounds is repeated below:

GR-S	100.00	0.00
Smoked sheets	0.00	100.00
Stearic acid	1.00	1.00
Sulfur	2.00	2.00
Pine tar	5.00	5.00
MPC black	45.00	45.00
Zinc oxide	5.00	5.00
Benzothiazyl disulfide	1.50	1.50
Diphenylguanidine	0.25	0.25

A few preliminary tests were carried out in order to determine the reproducibility of the results and the magnitude of the experimental error. A number of slabs of the desired thickness were vulcanized (press cure 50 min. at 45 lbs.) and their uniformity in swelling behaviour tested using benzene and n-heptane as swelling agents. In Table I are recorded the swelling tests made on test specimens taken from eight different slabs of the two test compounds. The data reported show that the supply of rubber specimens vulcanized for this investigation are sufficiently uniform.

All swelling tests were made on duplicate samples. The data reported for per cent swelling are the average of the two measurements rounded out to the nearest 5. Where the deviation of the two measurements from the average value was larger than 10, the test was repeated.

Table II shows the effect of the state of cure of the GR-S compound on swelling and explains why the 50 min. cure was chosen for further tests. Similar data have been presented in the literature for natural rubber compounds *(33)*.

Since a large number of liquids were to be tested, time swelling tests with frequent measurements of each sample would have required an unreasonable length

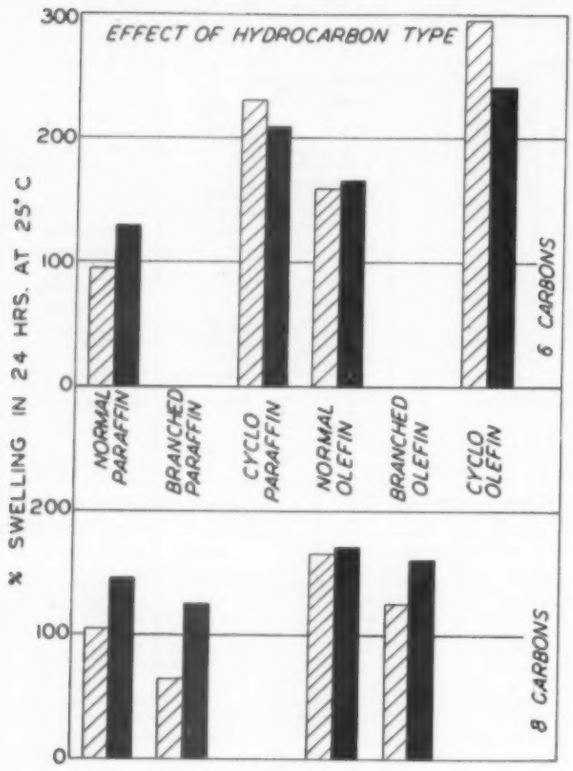


Figure 2.

of time. Before deciding on the test conditions, time-swelling tests with five different liquids were made on the two sizes* of test specimens used in the previous investigation *(1)*. The liquids used were benzene, turpentine, Stanco Reference Fluid SR-6, Stanco Reference Fluid SR-10, and n-heptane. From the results reported in Figure 1, it was judged that the 24 hour swelling of the thin specimen at 25° C. would give the figures sought for differentiating the swelling effect of the liquids. The per cent swelling after 24 hours at 25° C. approximates closely the maximum swelling as defined by Scott. The difference in swelling of the thin and thick samples can be taken as an indication of the penetration power of the liquids. During the course of the investigation it appeared interesting to make additional measurements, also recording with some liquids the swelling after 48 hours at 60° C.

Boiling range, refractive index (Abbe refractometer, 25° C.) and mixed aniline point of the liquids (aniline point of a 1:1 mixture by volume of the substance with n-heptane)** were accurately measured, and express the degree of purity of the sample. Specific gravity was measured with a set of hydrometers considered to be accurate to 0.005. Viscosity values were taken from *International Critical Tables;* Landolt and Boernstein, *Physikalisch-chemische Tabellen;* or Doss, *Physical Constants of the Principal Hydrocarbons* if listed as reliable. The remaining values were determined with a Hoeppler falling ball viscosimeter.

Experimental Results

In Table III are listed the liquids tested, their structure, their physical characteristics and swelling data. The liquids used in this investigation were selected to represent a wide range of organic compounds, which can be grouped in well-characterized classes. The table is largely self-explanatory and does not require detailed discussion.

In Figures 2 to 8 the results of the tests are summarized in an attempt to correlate the structure of the liquids with the difference in swelling between GR-S and natural rubber, and with the degree of swelling of each.

In Figure 2 is shown the slight influence of the chain length on swelling, by comparing the six carbon series with the eight carbon series of aliphatic hydrocarbons. The influence of unsaturation, ring closure and branching can be seen by comparing the hydrocarbons of each chain length among themselves.

In Figure 3 are arranged the six carbon compounds

* Thin specimen: 4.5 cm. x 2 cm. x 0.2 cm.; Thick specimen: 3 cm. x 1 cm. x 1 cm.

** The mixed aniline point was used since liquids were included in the present investigation whose straight aniline points are too low to be measured.

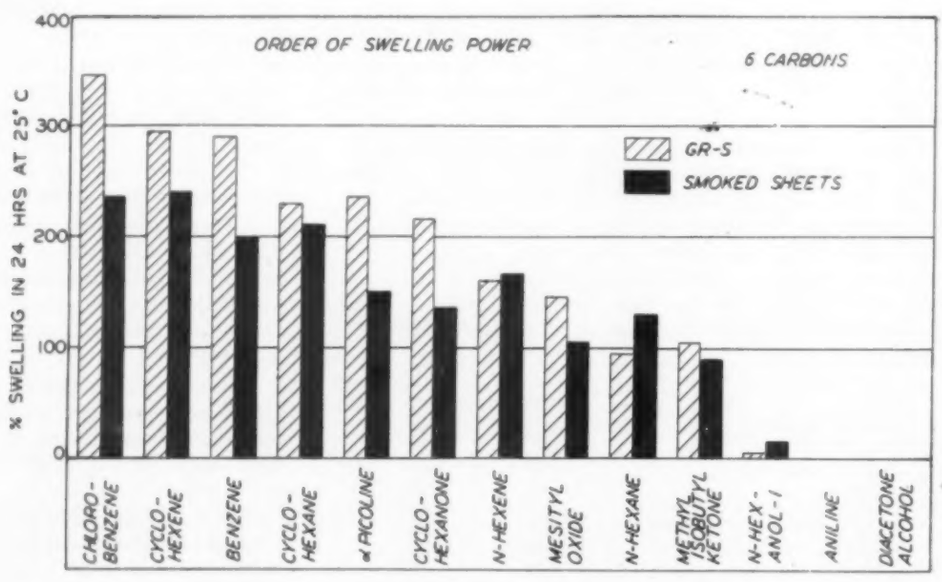


Figure 3.

in order of decreasing swelling power, giving a general picture of the relative swelling power of each type.

Figure 4 shows the increase in swelling power of cyclic hydrocarbons brought about by enlargement of the molecule by an additional ring. The lower swelling of methyl naphthalene† can be attributed to its high viscosity. The figures for swelling at 60° C. should be used for comparison in this case. The great influence of structure on swelling behaviour is demonstrated by the difference in swelling between phenylcyclohexane and tetrahydronapthalene where the difference in structure lies only in whether or not the two rings are condensed.

Figure 5 shows the influence of side chains in an aromatic hydrocarbon on swelling and penetration. Swelling of natural rubber is increased by increasing preponderance of paraffinic side chains, while with GR-S the effect is the reverse with side chains longer than methyl. With both rubbers the increase of viscosity of the liquids accompanying increasing number of side chains tends to decrease the penetrating power, as indicated by smaller swelling of the thick samples.

Figure 6 shows the influence of polar groups on swelling. Whitby's findings *(12)* are confirmed and can be extended to GR-S. The only exception to the similar effect of polar liquids on the two rubbers are the ketones, where the carbonyl group decreases the swelling of natural rubber, but has little effect on the swelling of GR-S.

Figure 7 demonstrates that the retarding influence of the carbonyl group on swelling becomes proportionally smaller with increase of chain length and ring closure.

† Methylnaphthalene was used for comparison, rather than naphthalene, since it is a liquid.

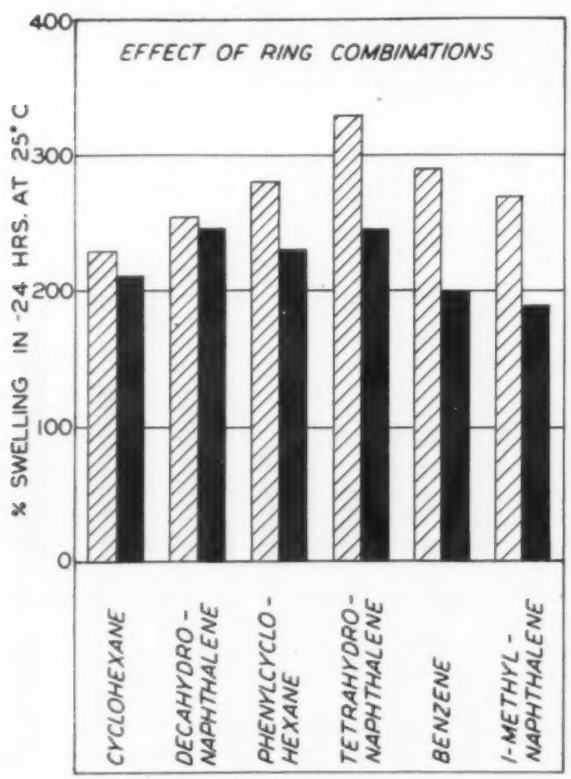


Figure 4.

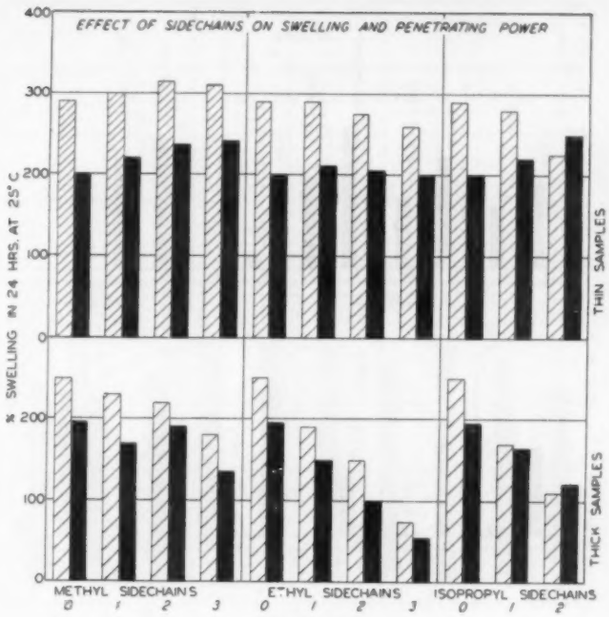


Figure 5.

Figure 8 depicts the difference in swelling due to swelling temperatures, and gives an indication of the incremental swelling and the deterioration of the rubber in the swelling liquids (the test specimens swollen in liquids 22, 23, 27, and 31 at 60° C. for 48 hours started to disintegrate). Figure 8 demonstrates that structure of the swelling liquids has a large influence on their action on the rubber. This figure also shows that increase of swelling temperature has a greater effect on natural rubber than on GR-S.

The data are too meager to warrant definite conclusions as to the interdependence of configuration of the liquid and deterioration of the rubber. However, there is an indication that long chains promote disintegration. The difference between *p*-cymene and diisopropylbenzene is interesting in that increase of the bulkiness of the structure of the compound appears to decrease the incremental swelling.

In connection with the matter of incremental swelling, it is noteworthy that the increased swelling at 60° C. with dipentene shown in Table III is due to the *p*-cymene present, as an impurity, since pure limonene shows no appreciable increase.

Refractive Index and Swelling

Attempts were made to correlate some physical property of all the liquids tested with their swelling effect, but no characteristic was found which permitted such correlation. Somewhat more successful were the attempts made to correlate the swelling effect of the hydrocarbons.

Since the refractive index is the physical constant of a hydrocarbon best expressing the structure numerically, it was a logical step to try to correlate the swelling data with the refractive index or values based on the refractive index, such as the molar refraction or specific refraction.* The refractive index seemed

* Correlation of swelling with dielectric constant and dielectric polarization are related to expressions using refractive index and molar refraction, since the dielectric constant is in many cases numerically equal to the square of the refractive index and the dielectric polarization to the Lorenz-Lorentz molar refraction.

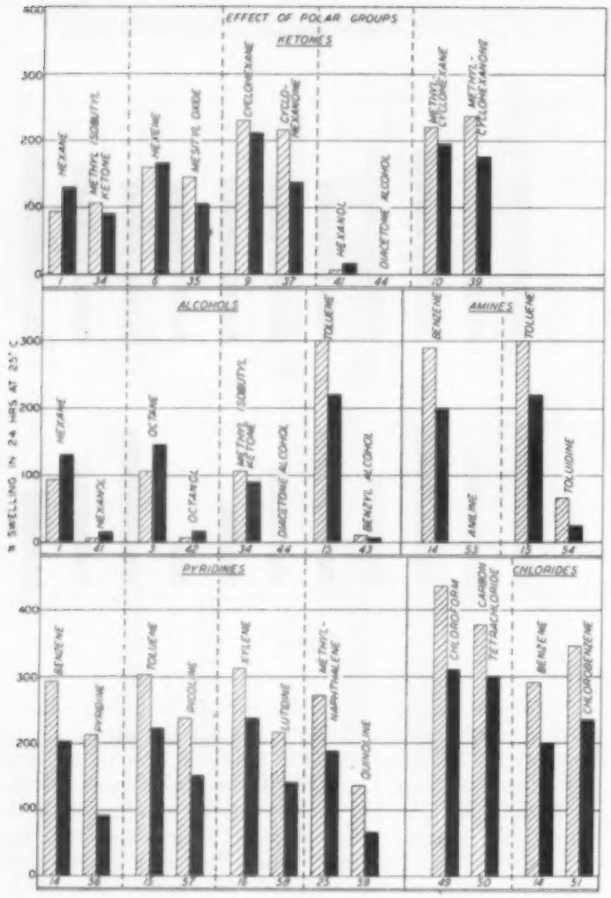


Figure 6.

to correspond with swelling power, with the limitation that, although refractive index increases with molecular weight in a homologous series, swelling of rubber appears to be little influenced by molecular weight.

Attempts to correlate the molar refraction or specific refraction with the swelling behaviour of the hydrocarbons measured were unsuccessful. In order to convert refractive index to terms which would be independent of molecular weight, and thus purely an expression of structure, a value designated in Table IV as $\triangle n_D^{25}$ was used. This value was obtained by subtracting from the refractive index for each hydrocarbon the refractive index of the straight chain paraffin having the same number of carbon atoms. These figures give a reasonably good correlation with swelling for both rubbers, as shown in Figure 9, where $\triangle n_D^{25}$ values are plotted against per cent swelling. The swelling figures reported in Table III for the thin samples swollen 24 hours at 25° C. were used, except for the more viscous liquids (Liquids No. 13, 25, and 26) for which the values at 60° C. probably better approximate the maximum swelling.

As expected, the graph expresses the general rule, that hydrocarbons with a $\triangle n_D^{25} < 0.02$ (aliphatic hydrocarbons) swell natural rubber more than GR-S, while hydrocarbons with a $\triangle n_D^{25} > 0.02$ swell GR-S more. The quantitative correlation of the per cent swelling with $\triangle n_D^{25}$ shows the greatest deviation for isoprene and diisopropylbenzene. It is probable that other dienes would fall off the curve in the same way, since their swelling behaviour can be expected to be like that of other aliphatics, while their refractive indices are comparatively high. In the case of diisopropylbenzene, the aliphatic character of the two isopropyl groups affects the swelling behaviour much more than the refractive index.

Aniline Point and Swelling

Although a number of investigators have found good correlation between aniline point and swelling behaviour of hydrocarbon mixtures of relatively high aniline point, the data of this investigation show that no single relationship between aniline point and swelling behaviour can be extended through as wide a range of hydrocarbons as were tested in this investigation. This is obvious from a glance at the figures in Table III, which show that the unsaturated aliphatic hydrocarbons (Group I-B) and the non-aromatic cyclic hydrocarbons (Groups I-C, I-D, I-G) fall in the same aniline point range, but have entirely different swelling behaviour.

This fact is shown graphically in Figure 10, where $\triangle$M.A.P. is a value obtained by subtracting from the mixed aniline point of the hydrocarbons, the mixed aniline point of the straight chain paraffin having the same number of carbon atoms. As with the refractive index, this calculation eliminates the variation due to molecular weight. The values are listed in Table V. The two double curves in Figure 10, one for GR-S, and one for natural rubber, seem to be the best expression for the correlation between swelling and a value based on aniline point.

The aniline point approach is actually more interesting and contains more possibilities than appears at first glance. The method is in fact a quick test of solubility of a liquid in aniline, with the inference that a similarity exists between this solubility and swelling of a high polymer substance in the liquid. In other words, it is assumed that, if one of two liquids under investigation is miscible with aniline at a lower

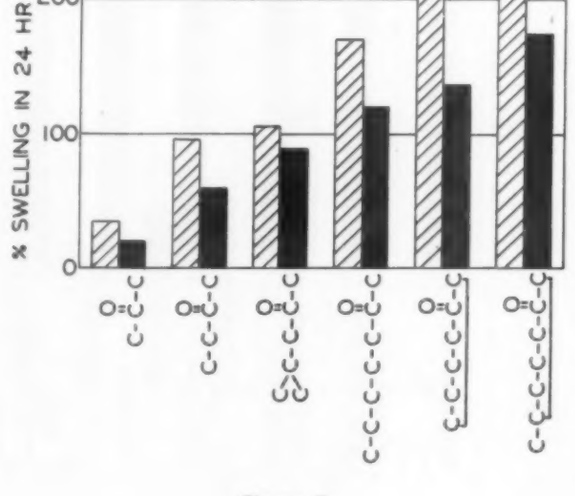


Figure 7.

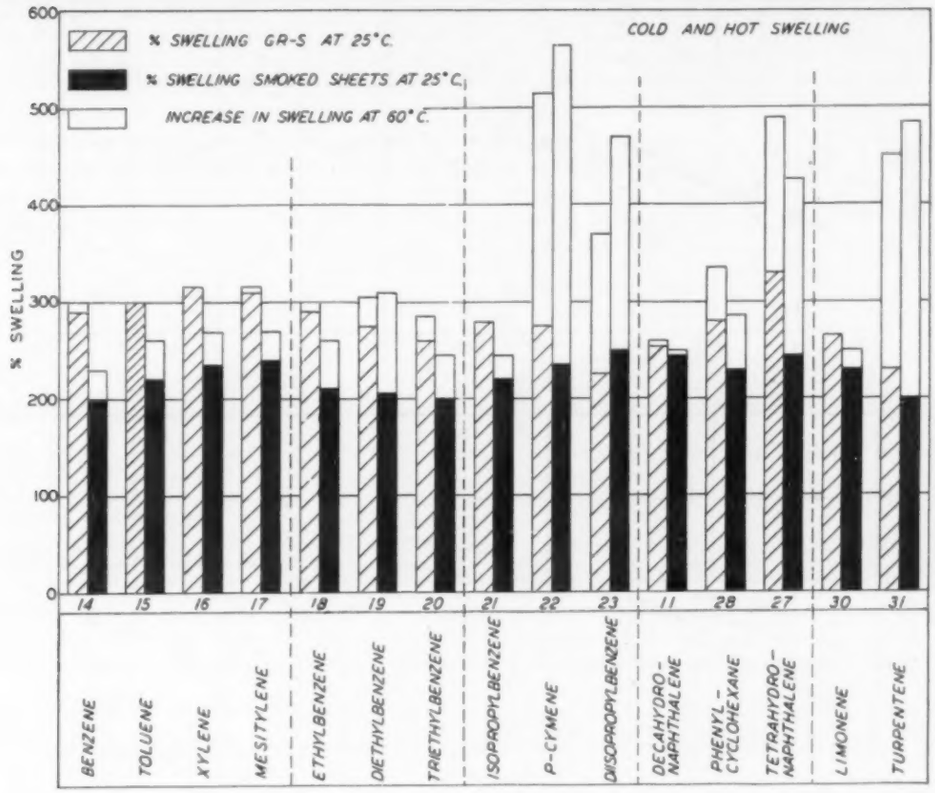


Figure 8.

temperature than the other, it will be more compatible with the high polymer substance and consequently a better swelling agent.

This concept deserves further investigation, and can probably be developed into a simple quick test of wide applicability. A test similar to the aniline point test is conceivable using instead of aniline, a liquid more akin to the particular rubber, for instance, a low molecular polymer of similar structure. An investigatio by Ferry, Gee and Treloar *(34)* dealing with the heats and entropies of dilution of natural rubber by various liquids is based on a very similar concept, using dihydromyrcene and squalene as low molecular homologues of natural rubber.

Summary

Generalizations which can be made from data for swelling at room temperature are:

1. Only saturated aliphatic hydrocarbons show preferential swelling for natural rubber over GR-S.

2. Aromatic hydrocarbons, unsaturated alicyclic hydrocarbons, hydrocarbons of mixed aromatic and alicyclic character, ketones, chlorine derivatives, aromatic amines, pyridines, and sulfur compounds show preferential swelling for GR-S over natural rubber. The preferential swelling of GR-S in liquids of ring structure can be visualized as a process of similarly shaped molecules surrounding the protruding benzene rings of the GR-S chains, and thus increasing their separation.

3. Unsaturated aliphatic hydrocarbons, saturated alicyclic hydrocarbons, cyclic terpene hydrocarbons, ethers and esters show approximately the same swelling for GR-S and natural rubber.

4. The degree of preferential swelling depends on the structure of the swelling liquid. Ring closure and increase of unsaturation bring about a comparatively higher swelling of GR-S; introduction of side chains, a comparative increase of the swelling of natural rubber.

5. The effect of polar groups in the molecule of the liquid is in general to decrease the swelling of both rubbers, with the exceptions of chlorine which in-

TABLE IV

Number of Carbon atoms	n_D^{25} Straight chain paraffin	Liquid No.	Designation	n_D^{25} Measured	Δn_D^{25}
C_5	1.3557	5	Isoprene	1.4170	0.0613
C_6	1.3731	1	Hexane	1.3756	0.0025
		6	Hexene-1	1.3830	0.0099
		9	Cyclohexane	1.4230	0.0499
		12	Cyclohexene	1.4449	0.0718
		14	Benzene	1.4999	0.1268
C_7	1.3857	2	Heptane	1.3860	0.0003
		10	Methylcyclohexane	1.4219	0.0362
		15	Toluene	1.4956	0.1099
C_8	1.3956	3	Octane	1.3950	—0.0006
		4	Trimethylpentane	1.3900	—0.0056
		7	Octene	1.4109	0.0153
		8	Diisobutylene	1.4080	0.0124
		16	Xylene	1.4946	0.0990
		18	Ethylbenzene	1.4951	0.0995
		24	Styrene	1.5437	0.1481
C_9	1.4036	17	Mesitylene	1.4950	0.0914
		21	Isopropylbenzene	1.4891	0.0855
C_{10}	1.4101	11	Decahydronaphthalene	1.4750	0.0649
		13	Dicyclopentadiene	1.5090	0.0989
		19	Diethylbenzene	1.4929	0.0828
		22	p-Cymene	1.4881	0.0780
		27	Tetrahydronaphthalene	1.5412	0.1311
		29	Dipentene	1.4710	0.0609
		30	Limonene	1.4701	0.0600
		31	Turpentine	1.4665	0.0564
C_{11}	1.4170	25	Methylnaphthalene	1.6024	0.1854
C_{12}	1.4198	20	Triethylbenzene	1.4971	0.0773
		23	Diisopropylbenzene	1.4923	0.0725
		26	Dimethylnaphthalene	1.6030	0.1832
		28	Phenylcyclohexane	1.5232	0.1034

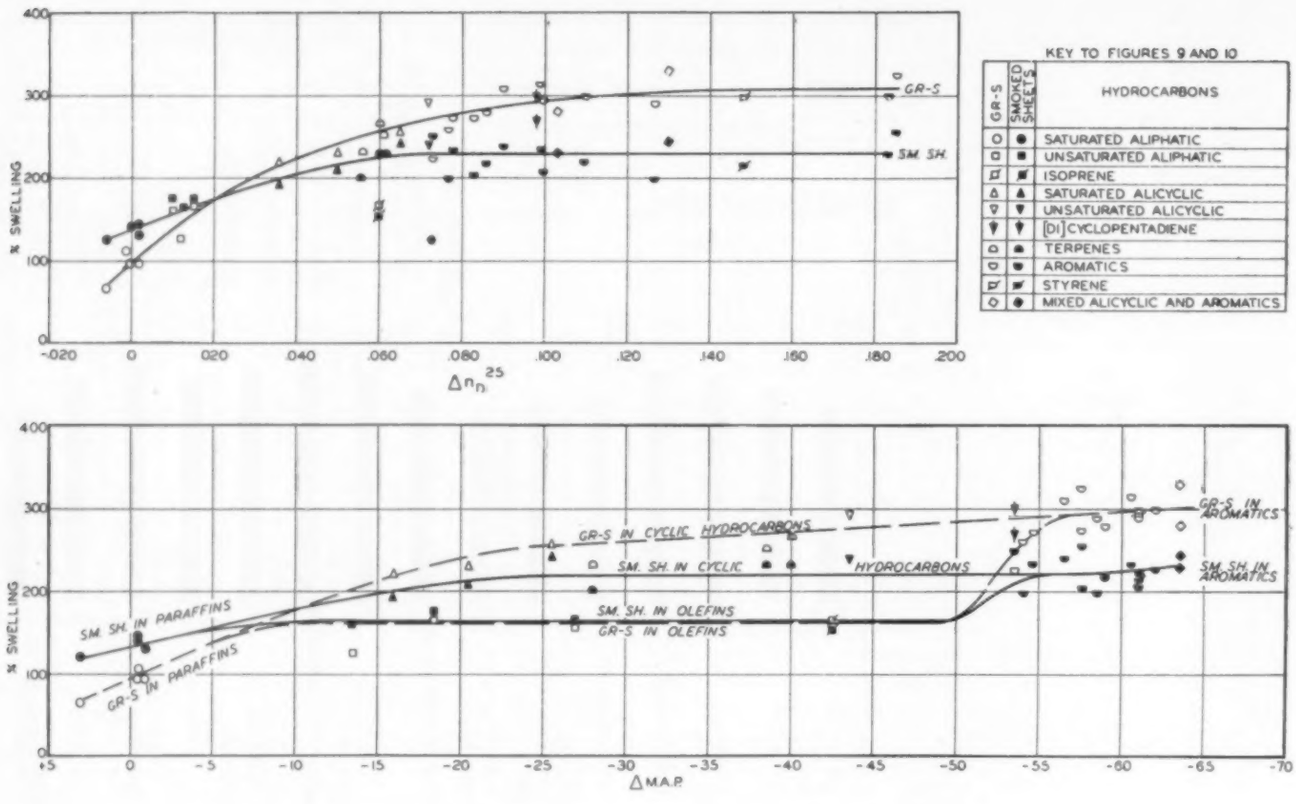


Figure 9 (top). Figure 10 (bottom).

TABLE V

Number of Carbon atoms	Straight chain paraffin: Aniline Point ° C.	Straight chain paraffin: Mixed Aniline Point (calc.)**	Liquid No.	Designation	Mixed Aniline Point ° C.	ΔM.A.P.
C_5	71.7*	70.5	5	Isoprene	28.0	—42.5
C_6	69.1*	69.5	1	Hexane	68.5	— 1.0
			6	Hexene	42.5	—27.0
			9	Cyclohexane	49.0	—20.5
			12	Cyclohexene	26.0	—43.5
			14	Benzene	11.0	—58.5
C_7	70.6	70.0	2	Heptane	69.5	— 0.5
			10	Methylcyclohexane	54.0	—16.0
			15	Toluene	9.0	—61.0
C_8	72.1*	71.0	3	Octane	70.5	— 0.5
			4	Trimethylpentane	74.0	3.0
			7	Octene	52.5	—18.5
			8	Diisobutylene	57.5	—13.5
			16	Xylene	10.5	—60.5
			18	Ethylbenzene	10.0	—61.0
			24	Styrene	10.0	—61.0
C_9	74.9*	72.5	17	Mesitylene	16.0	—56.5
			21	Isopropylbenzene	13.5	—59.0
C_{10}	77.5	73.5	11	Decahydronaphthalene	48.0	—25.5
			13	Dicyclopentadiene	20.0	—53.5
			19	Diethylbenzene	16.0	—57.5
			22	p-Cymene	19.0	—54.5
			27	Tetrahydronaphthalene	10.0	—63.5
			29	Dipentene	35.0	—38.5
			30	Limonene	33.5	—40.0
			31	Turpentine	45.5	—28.0
C_{11}	80.6	75.0	25	Methylnaphthalene	17.5	—57.5
C_{12}	83.7	76.5	20	Triethylbenzene	22.5	—54.0
			23	Diisopropylbenzene	23.0	—53.5
			26	Dimethylnaphthalene	14.5	—62.0
			28	Phenylcyclohexane	13.0	—63.5

* Critical Solution Temperature.
** Calculated as the arithmetic mean of the straight aniline point and the aniline point of the heptane sample used as the diluent in the mixed aniline point test (69.7° C.).

creases swelling power and the keto group which has little effect on the swelling of GR-S.

The data on swelling at elevated temperatures suggest the following:

6. The difference in swelling at room temperature and elevated temperatures can be taken for low viscous liquids as a measure of the incremental swelling as defined by Scott.

7. The incremental swelling of natural rubber is, as a rule, greater than that of GR-S with all liquids, and brings about rapid deterioration of the rubber.

8. Structural configuration seems to have considerable influence on the incremental swelling.

9. Side chains on aromatic hydrocarbons seem to increase the incremental swelling.

The comparison of the physical characteristics of the swelling liquids with the swelling data shows that:

10. No physical constant or combination of physical constants of the liquids correlate with swelling power for a wide range of liquids. However, in the case of the hydrocarbons, the refractive index can be correlated with swelling power, if the refractive index is reduced to a measure of structure by using instead of n_D, the refractive index itself, Δn_D, the difference between it and the refractive index of the corresponding straight chain paraffin. A similar, but somewhat more complicated relationship, also exists in the case of hydrocarbons for the aniline point when used in the expression ΔM.A.P.

Conclusions

The assumptions made in the previously reported investigation *(1)* that paraffinic hydrocarbons will swell natural rubber more than GR-S, and aromatic

hydrocarbons, GR-S more than natural rubber, are correct, and extend to compounds other than hydrocarbons, and to rings other than aromatic.

Qualitative generalizations as to swelling of GR-S and smoked sheets in organic liquids can be made on the basis of the structure of the liquid and the polymer. Structural similarity appears to be the predominant factor in comparative swelling of rubbers in liquids.

ACKNOWLEDGMENT

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LITERATURE REFERENCES

(1) K. S. Rostler and R. M. White, *Rubber Age (N.Y.)*, **58**, 585 (1946).
(2) T. R. Dawson and B. D. Porritt, *Rubber, Physical and Chemical Properties*, page 438 (Croydon, England, 1935).
(3) J. R. Scott, *Trans. Inst. Rubber Ind.*, **5**, 95 (1929); *Rubber Chem. Tech.*, **3**, 3.
(4) J. R. Scott, *Trans. Inst. Rubber Ind.*, **13**, 109 (1937); *Rubber Chem Tech.*, **11**, 147,
(5) J. R. Scott, *J. Rubber Research*, **6**, 47 (1937).
(6) J. R. Scott, *J. Rubber Research*, **6**, 53 (1937).
(7) J. R. Scott, *J. Rubber Research*, **7**, 9 (1938).
(8) T. H. Messinger and J. R. Scott, *J. Rubber Research*, **8**, 1 (1939).
(9) J. R. Scott, *J. Rubber Research*, **8**, 11 (1939); Condensed in *Rubber Chem. Tech.*, **12**, 842.
(10) R. W. Parris and J. R. Scott, *J. Rubber Research*, **10**, 123 (1941); *Rubber Chem. Tech.*, **15**, 280.
(11) G. S. Whitby, *J. Phys. Chem.*, **36**, 198 (1932).
(12) G. S. Whitby, A. B. A. Evans and D. S. Pasternack, *Trans. Faraday Soc.*, **38**, 269 (1942); *Rubber Chem. Tech.*, **15**, 553.
(13) K. H. Meyer and H. Mark, *Ber.*, **61**, 1939 (1928).
(14) H. Fikentscher and H. Mark, *Kautschuk*, **6**, 2 (1930); *Rubber Chem. Tech.*, **3**, 201.
(15) H. Mark, *Ind. Eng. Chem.*, **34**, 1343 (1942); *Rubber Chem. Tech.*, **16**, 268.
(16) E. A. Hauser, *Ind. Eng. Chem.*, **21**, 249 (1929); *Rubber Chem Tech.*, **3**, 301.
(17) E. Ott in *Advancing Fronts in Chemistry*, Vol. I, page 75 (New York, Reinhold Publishing Corp. 1945).
(18) Wo. Ostwald *Kolloid-Z.*, **29**, 100 (1923).
(19) N. Ermolenko and S. Levina, *Kolloid-Z.*, **75**, 59 (1936); *Rubber Chem. Tech.*, **10**, 105.
(20) G. Gee and L. R. G. Treloar, *Trans. Faraday Soc.*, **38**, 147 (1942); *Rubber Chem. Tech.*, **16**, 89.
(21) G. Gee, *Trans. Faraday Soc.*, **38**, 276 (1942); *Rubber Chem. Tech.*, **15**, 545.
(22) G. Gee, *Trans. Faraday Soc.*, **38**, 418 (1942); *Rubber Chem. Tech.*, **16**, 263.
(23) G. Gee, *Trans. Inst. Rubber Ind.*, **18**, 266 (1943); *Rubber Chem. Tech.*, **16**, 818.
(24) G. Gee, *Trans. Faraday Soc.*, **40**, 463, 468 (1944); *Rubber Chem. Tech.*, **18**, 236, 241.
(25) G. Gee, *India-Rubber J.*, **108**, 349 (1945); *Rubber Chem. Tech.*, **18**, 716.
(26) P. J. Flory and J. Rehner, *J. Chem. Phys.*, **11**, 521 (1943).
(27) D. F. Fraser, *Ind. Eng. Chem.*, **32**, 320 (1940); *Rubber Chem. Tech.*, **14**, 196.
(28) D. F. Fraser, *Rubber Chem. Tech.*, **14**, 204 (1941).
(29) D. F. Fraser, *Ind. Eng. Chem.*, **34**, 1298 (1942).
(30) D. F. Fraser, *Ind. Eng. Chem.*, **35**, 947 (1943); *Rubber Chem. Tech.*, **17**, 185.
(31) F. H. Carman, P. O. Power, and H. A. Robinson, *Ind. Eng. Chem.*, **32**, 1069 (1940); *Rubber Chem. Tech.*, **13**, 936.
(32) A.S.T.M. Standards 1944, Vol. III, page 1788 (Specification D471-44T).
(33) T. R. Dawson and B. D. Porritt, *Rubber, Physical and Chemical Properties*, page 145 (Croydon, England, 1935).
(34) J. Ferry, G. Gee and L. R. G. Treloar, *Trans. Faraday Soc.*, **41**, 340 (1945); *Rubber Chem. Tech.*, **19**, 1.

Versator Processing Machine

DEVELOPMENT of a new and highly versatile processing tool, known as the Versator, has been announced by the Cornell Machine Co., 101 Park Ave., New York 17, N. Y. The new machine is reported to make it possible, for the first time, to reduce centrifugally any flowable material (from the most fluid to the most viscous) to a micro- or mono-particle film without the application of mechanical pressure and without any temperature rise.

The Versator consists of a vacuum or pressure chamber in which a 26″-diameter disc in the form of an open bowl operates at high speed. As the material being processed is fed onto the center of the spinning disc in the form of an exceedingly thin film, centrifugal force makes it flow out radially in ever-widening spirals which reach minimum thickness and maximum velocity at the perimeter of the disc. The slope and speed of the disc produce a highly turbulent film which becomes virtually "all surface"—an ideal state for the application of vacuum or pressure, heat or cold, diffusional processes or irradiation.

The Versator can be used for homogenizing, emulsifying, reversing emulsions, dispersing solids in liquid vehicles, de-gassing or deaerating solutions; for evaporating, dehydrating or distilling extremely heat-sensitive materials without thermal decomposition; for impregnation, wetting, or hydration of fibres or solid particles; for diffusional processes; for oxidations or continuous hydrogenations; for instantaneous, continuous reactions, etc. Its versatility has made it a valuable new tool for users of ball mills, colloid mills, conventional homogenizers, emulsifiers, batch mixers, deaerators, evaporators, roller mills, dough mixers, vacuum stills, or similar processing equipment.

Through-put capacities range from 10 to 100 gpm. Power consumption is less than 7½ hp for viscosities no greater than those of heavy lubricating oils and somewhat higher for really viscous materials. Disc speeds may be as low as 900 rpm but the optimum speed for most operations is about 1800 rpm. The Versator is available in steel, stainless steel, nickel, Monel Metal, Everdur, etc., and can be rented for a full year for either experimental or production runs.

Early Studies on the Fractionation of Rubber

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IN A recent issue of this Journal (*Rubber Age*, Vol. 53, pp. 59-65, Oct., 1945), Hauser, le Beau and Yen Shen have published the results of a number of interesting observations on the various molecular fractions of rubber and their behavior during vulcanization. In the course of this publication the authors have referred to some early work of the present writer, published in part in conjunction with the late C. Beadle *(1)*. As the authors remark, "Therefore they (*i.e.*, Beadle and Stevens) really must be considered to have been the first who studied the properties of fractionated rubber," the present writer would like to refer in this connection to one or two more points.

The authors point out that Beadle and Stevens "based their deductions on the coefficient of vulcanization which depends on the amount of combined sulphur." This is true, but we also determined the physical properties of the vulcanizate. At that early date a method for determining tensile strength had not yet been worked out and no reliable machinery had been devised.

It was necessary to work with such machines as were then available, and the Schwartz Hysteresis machine *(2)* was chosen. This consists briefly of two grips to take a strip of rubber suspended vertically and in line with a spiral spring. Tension is applied by a worm gear. Silk cords attached to the end of the rubber strip and the coiled spring respectively give (a) the elongation of the spring which is taken as being proportional to the load applied, and (b) the elongation of the rubber. The movements of the cords are transferred to a sliding panel and a pencil travelling on rails at right angles to the movement of the panel. In this way hysteresis curves are traced on a sheet of paper laid on the panel. The apparatus is very delicate and excellent tracings can be obtained.

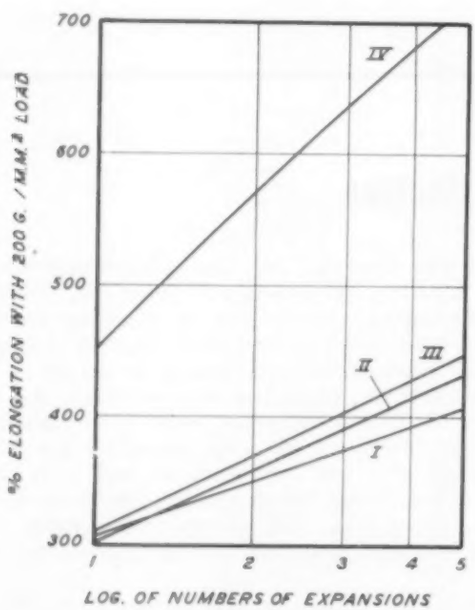

FIG. 1—Elongation versus number of expansions. (Cure: 3 hours at 2.46 kg./sq. cm.).

I—Original rubber untreated; II—Original rubber swollen; III—Bottom layer containing nitrogen; IV—Top layer practically free of nitrogen.

The disadvantage of the instrument lies in the attachments of the rubber strip which consisting of plain clamps tends to allow the rubber to break in the grips long before reaching maximum tensile figures, so that only a moderate elongation is practicable. Had the machine been fitted with pulleys for rings or wide grips for dumbbell-shaped test pieces, it would have been entirely satisfactory. But Schwartz designed the machine for testing cable insulations. These stripped from the conductor cannot very well be cut into ring or dumbbell form.

It is usual to trace five consecutive hysteresis loops. If the elongation at the termination of each loop, *i.e.*, the maximum elongation for each successive loop, be measured, these are found to follow a logarithmic relationship, and when plotted, as for instance on pages 64 and 65 of the first mentioned reference *(1)* (Figs. 1 and 2), the logarithms of 1 to 5 give substantially straight lines. The position of these may be taken as a measure of the degree of physical vulcanization. It will be seen from the figures that as the cure proceeds the curves change in position and tend to the horizontal. These physical changes are reflected in the figures for coefficients of vulcanization, *i.e.*, relative percentages of combined sulfur.

It would lead too far to discuss in detail this method for the physical testing of vulcanizates, but it deserves further consideration. It is being recognized that not only is the actual tensile strength a matter of less interest than the stretching properties, particularly under varying temperatures, but also that the actual figures for tensile are very liable to error, arising from the condition of the cutters and other experimental details. The machine too, if suitably modified, is far better adapted for stretching tests and for tracing hysteresis loops than those now designed for tensile strength determinations.

It can be said, therefore, that Beadle and Stevens based their deductions not only on the coefficient of vulcanization as stated by Hauser, le Beau and Shen, but also on the physical properties of the vulcanizates.

A little later the writer carried the matter a stage further. In a paper published in the *India-Rubber Journal (3)*, he separated smoked sheet into four sol fractions by extraction with benzene, allowing the rubber to swell without disturbance, decanting the clear

supernatant liquor, adding fresh solvent, setting the solution aside for a time, decanting again, and so forth. The rubber was recovered from each fraction by spontaneous evaporation. To avoid any effect due to the different age of the fractions, they were put aside for a period of twelve months before testing. The viscosity of a 0.75% solution and also of lower concentrations were determined, and the viscosities relative to benzene plotted against the concentration of the solution as shown in Fig. 3, curves I to IV. Curves A, B and C were added to determine the effect of added resins.

It was anticipated that the first fraction would contain most of the resins and the fourth fraction practically none at all. The differences in viscosity, at least so far as fractions I to III are concerned, might have resulted from this variation in resin content. At the time that work was carried out, it was concluded that the variations in viscosity of the fractions I to IV could be ascribed to two causes which were set out in the paper as follows: (1) To varying quantities of resinous or other soluble non-caoutchouc matter; and (2) To a variation in the degree of aggregation of the caoutchouc.

Viewing the matter in the light of modern knowledge it is certain that the variations, particularly as shown by a comparison of curve IV with curves I to III, could not have been produced by variations in resin contents but must be ascribed to the degree of aggregation* or, as we should say today, the average length of the long chain molecules. This work would therefore appear to be the first published in which rubber was separated into fractions of increasing molecular weight, as ascertained by viscosity determinations, by progressive extraction with solvents.

There remains one other point of interest regarding these early separations. As the soluble fraction or sol rubber contained but a trace of nitrogen and vulcanized very slowly and incompletely and the residue or gel rubber contained nearly if not all the nitrogen and vulcanized very rapidly, giving a stiff, tough vulcanizate, the original rubber occupying an intermediate position, it was naturally concluded that the difference in vulcanizing properties was related to the nitrogen content, *i.e.*, the amount of protein present.

Hauser, le Beau and Shen have referred to this and discussed very fully the causes of the variations in rates of vulcanization so that there is no need to go into these points again in detail. The writer desires, however, to point out that in view of the great extension of our knowledge of vulcanization since the date of his early publication, it is unlikely that the conclusions then drawn regarding the paramount influence exerted by the proteins are correct.

There are indeed two other factors: (a) the residue consists of gel rubber and fractions of gel rubber have been shown to vulcanize faster and give a tougher vulcanizate than sol rubbers, see for example Fig. 5 in Hauser et al's paper *(5)*, and (b) always associated with the protein are simpler substances, especially

* At this date the rubber molecule was regarded generally as an aggregation of smaller molecules on the micelle pattern.

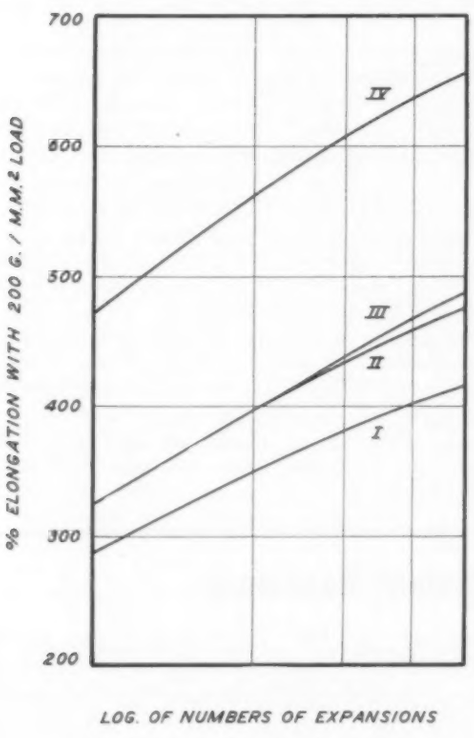

FIG. 2—Elongation versus number of expansions. (Cure: 3 hours at 2.46 kg./sq. cm.).

I—Original rubber untreated; II—Original rubber swollen; III—Bottom layer containing nitrogen; IV—Top layer practically free of nitrogen.

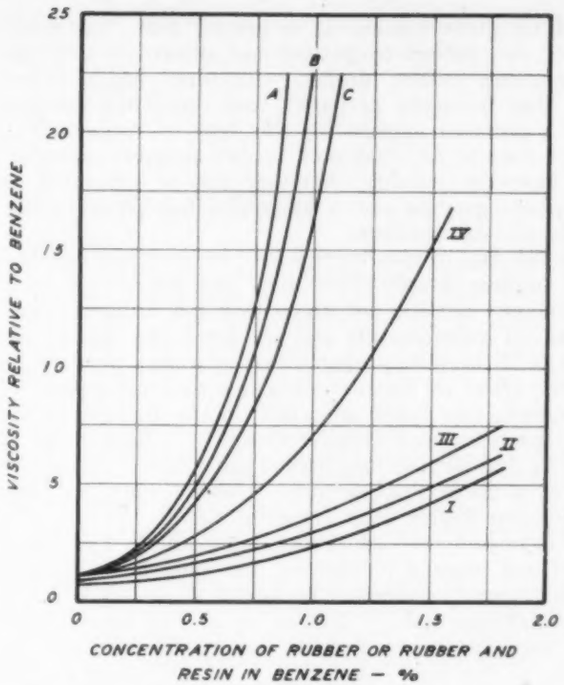

FIG. 3—Viscosity relationship of rubber sol fraction to concentration.

Curve I—Lowest molecular weight fraction; Curves II and III—Intermediate molecular weight fractions; Curve IV—Highest molecular weight fractions; Curves A, B and C—Molecular weight fractions with added resin.

based on putrefaction. It is known that "matured" rubber, *i.e.*, rubber coagulated and allowed to undergo putrefaction before drying, vulcanizes much faster than that normally prepared, and there has recently been a renewed inquiry for this type of rubber. The writer showed *(4)* that such rubber contains putrefaction bases in quantity, that they can be separated as phosphotungstates, and when added to normal rubber accelerate vulcanization.

At the date of this early work we were not familiar with organic accelerators, they had not as yet been discovered; but we did know that raw rubber varied in rate of vulcanization and we attributed this to the protein. It is more probable that at least a part of the specific effect of the protein is due to small quantities of putrefactive bases adsorbed on the surface of the latex particles and carried down by coagulation. It may be that without some such putrefactive bases acting as a natural accelerator, rubber would not vulcanize appreciably with sulfur alone.

It is known that sol rubber, *e.g.*, sample 4 in Table II of our original publication, can only be vulcanized if an organic accelerator be added as is usual in test vulcanizations today. Hauser et al *(5)* have shown that high and low molecular weight sol fractions vulcanize at the same rate (Fig. 5 of their paper), but would this have been the case had they omitted the accelerator (Captax) from their mix and used only sulfur for vulcanizing the rubber? The use of a powerfully accelerated mix might well obscure the naturally inherent vulcanizing capacity of their sol rubbers.

If both fractions of sol rubber vulcanize at the same rate in Hauser et al's mix it seems likely that gel rubber freed from all protein and natural accessory bodies would vulcanize at the same rate. If this is so, there is no alternative to the conclusion that protein and/or accessory substances are the actual cause of the difference in rate of sulfur combination between the sol and gel rubber.

It is noted that there is little difference between the rate of sulfur combination of A and D. The writer found a much greater difference (Table 1, samples 2 and 3) and this may be attributed to the use by him of a simple rubber sulfur mix.

On the other hand, the physical differences (Figs. 1 and 2) are much smaller, particularly the specimens in Fig. 1. Before the introduction of organic accelerators there was generally a close concordance between coefficient of vulcanization, *i.e.*, combined sulfur and physical properties. This still holds, as a rule, if samples are compared using the same mix. But as is now well known, the more efficient the accelerator and the greater the speed of physical vulcanization, the smaller the percentage of sulfur combined. This and other considerations lead to the conclusion that combination with sulfur (or other vulcanizing agent) is not essential to vulcanization and linking up of the long chain molecules can be effected without sulfur or oxygen, etc.

The fact that there is a discrepancy between combined sulfur and the physical properties of compounds reported by me earlier indicates that the difference in rate of sulfur combination is largely if not entirely due to the natural accelerator present.

TABLE I

	1	2	3	4
Nitrogen Content of Unvulcanized Rubber Samples				
Nitrogen in per cent of rubber	0.48	0.48	0.80	0.025
Study of Vulcanized Rubber				
Free sulfur in per cent rubber	2.32	2.20	1.70	4.45
Bound sulfur	2.68	2.80	3.30	0.55
Per Cent Elongation With Constant Load				
1. Elongation	321.6	322.4	291.2	470.4
5. Elongation	487.2	481.6	417.6	656.0
After retractions	46.8	46.0	37.6	125.6
Three Hour Vulcanization at a Pressure of 2.46 kg/qcm				
Free sulfur in per cent rubber	1.24	1.23	0.79	2.54
Bound sulfur	3.76	3.77	4.21	2.46
Per Cent Elongation With Constant Load (200 g/qmm)				
1. Elongation	303.2	309.2	305.2	452.4
5. Elongation	429.2	444.0	401.6	716.0
After retractions	30.4	32.8	26.4	77.2

LITERATURE REFERENCES

(1) Beadle, C., and Stevens, H. P., *Koll. Z.*, **11**, 61 (1912); **12**, 46 (1913). Stevens, H. P., *Ibid*, **14**, 91 (1914).
(2) Schwartz, A., *J. Inst. Elec. Eng.*, **39**, 31 (1907); **44**, 693 (1910). Schwartz, A., and Kemp, P., *Mem. & Proc. Manchester Soc.*, **55**, No. IX (1911). See also *J. Munic. Sch. Tech. Manchester*, **4**, 221 (1911). Also "Plantation Rubber and the Testing of Rubber," by G. S. Whitby, published by Longmans, Green & Co. (1920), p. 418, where an illustration of the Schwartz machine is given.
(3) Stevens, H. P., *I.R.J.*, **46**, 345 (1913).
(4) Stevens, H. P., *J. Soc. Chem. Ind.*, **36** (1917).
(5) Hauser, E. A., le Beau, D. S., and Shen, Y., *R.A. (N.Y.)*, **58**, 59 (1945).

Applications of Corrosion-Resistant Resoweld

SOUR crude oil of the vast West Texas fields, long considered the worst enemy of storage tank life, has been subdued by corrosion-resistant Resoweld—a wartime development of the Goodyear Tire & Rubber Company, Akron, Ohio. Steel storage tanks in this area, subjected to the corrosive effect of the oil, have required frequent replacements. Different types of lining materials have been used to combat the action, but with varied success. Two years ago a number of tanks were lined with Resoweld. A recent inspection showed the new plastic paint was unaffected. Indications are that Resoweld will last longer than former linings.

Despite the fact Resoweld was designed for a specific job, new applications have been found in ceilings, beams and other surfaces exposed to corrosive attack. It has exceptional resistance to acids, alkalis and salt solutions and is insoluble in aliphatic solvents (gasoline, naphtha), water and alcohol. However, new tests are revealing many additional advantages, such as its ability to prevent destruction of metal caused by electrolytic action in oil storage tanks. This type of deterioration has long been considered an important factor in the life of such tanks.

Adhesives for Rubber

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THE field of adhesives of interest to the rubber industry has in recent years become so large and complex that in a paper of reasonable length one must be confined to a few specific types. This is, of course, due to the tremendous advancement and knowledge of the synthesis of an almost endless variety of synthetic elastomers which not only introduce problems in adhesion, but also provide the basis for many new types of adhesives. This discussion will therefore, be primarily limited to what we may call adhesives for rubber as contrasted to adhesives derived from rubber. Since some of the compositions developed primarily for rubber have proven to be otherwise useful, some consideration must also be given them.

History of the Art

The first recorded patent on the use of rubber as an adhesive must be attributed to Charles Goodyear under date of September 9, 1835, when he described the use of a transparent rubber cement loaded with magnesia for the purpose of coating or mending fabrics. It is quite interesting to note that it took the rubber industry almost 110 years after this disclosure to develop a really suitable rubber base cement for the mending or fabrication of fabric articles which, incidentally, could and should be a very fruitful field for the rubber technologist as well as being a great aid to the clothing and allied industries.

About eight years later in 1843 Jeffery discovered that mixtures of rubber and shellac were suitable for wood, cloth and leather adhesives. In 1865 rubber and isinglass when mixed were said to be suitable for the same purpose. Here again as in Goodyear's discovery we find that the limitations of natural rubber were such that blends of resinous materials with rubbers were of little value for wood, cloth and leather adhesives until the advent of the synthetics.

In 1853 we again find Charles Goodyear contributing to the art by disclosing bonding to metal with hard rubber. He took 6 to 8 ounces of rubber per pound of gum and vulcanized the rubber and metal together. Unlike the patents of today, he did not disclose just what value of adhesion he obtained.

Perhaps the first disclosure of what appeared to be an integral bond of rubber to metal was made by Colby around 1860 when he described a method of bonding a rubber roll to a shaft. His method consisted of pre-vulcanizing the rubber tube with the hole slightly smaller than the shaft. He then heated the metal shaft above the melting point of the rubber and forced it into position. After cooling the bond was said to be greater than the strength of the rubber itself.

In 1866 a gentleman by the name of Albert Leach patented a rubber adhesive made from a mixture of rubber, ivory black and sulfuric acid. He used 100 parts of rubber, 25 parts of black and 6-7 parts of sulfuric acid which he described as a hardening agent. This was the first of a series of patents on the use of rubber isomers as adhesives, although some sixty years elapsed before the next one appeared. The treatment of metal with tin tetrachloride as a means of promoting adhesion was described in 1882, and what appears to be the first indication of the adhesive value of rubber chloride was described three years later in 1885. The surface of the rubber was coated with silver chloride and vulcanized to gold. The chlorine was said to be driven off leaving a coating of pure gold and silver bonded to the rubber. If this were true and adhesion did develop then it is quite probable that a rubber chloride was formed.

LEFT: This rubber-covered carbon washer was coated with a chlorinated rubber type cement to which a neoprene compound was adhered. RIGHT: In the case of this bushing, made of a steel outer metal and powdered bronze inner metal, adhesion was obtained by blasting the adhesion surfaces and then coating with a chlorinated rubber type cement.

Note: This article is based on a talk under the same title delivered by the author before the Chicago Rubber Group on May 24, 1946.

One of the most pertinent and interesting of the old patents was one granted to Woodward in 1882. This patent describes a method of obtaining adhesion of vulcanized rubber to other materials by the simple expedient of resinifying the rubber surface to be adhered by treatment for a few seconds with sulfuric acid. By such a preparation the surface is "adapted to be secured by means of glue, mucilage, paste, varnish, gums, resin, cement or other adhesive compounds to wood, glass, etc." Strange as it may seem the rubber industry had never taken advantage of this method of obtaining adhesion of vulcanized rubber compounds to metals or other materials until a few years ago. Although sulfuric acid only was disclosed by Woodward, equally good results are obtained at a somewhat slower rate by nitric acid, perchloric acid, halogenation, etc. A particularly rapid and perhaps easier method from the standpoint of production is the treatment of the rubber surface with a solvent containing bromine.

By any of these treatments cured rubber can be integrally adhered to practically any material with adhesives ranging from shellac to the latest thermosetting types. By the proper application of the adhesive integral adhesions can be obtained without heat and only contact pressure providing the pieces to be joined are not disturbed until the solvent has dried. With heat and only contact pressure good bonds can be obtained in only a few seconds after the interface has reached its fusion temperature. The fundamental idea behind this method described some 64 years ago still provides the best means of obtaining good bonds of vulcanized rubber to other materials although considerable progress has been made during the last few years with certain synthetic rubber cements and by careful compounding of some of the synthetic rubbers.

Getting into the more modern times another method of obtaining excellent adhesions of rubbers to other materials which has not been taken advantage of was disclosed by Morse in his patent of 1936. Reduced to its simplest form this process consists of providing a tie gum so compounded to be reactive to ultra-violet rays in such a manner that the surface so treated readily adheres to almost any other material under the influence of heat and pressure. The theory behind the compounding of such a reactive tie gum is to provide first a white stock preferably by loading with zinc oxide or lithopone, and second to use a class of accelerators which we may term "poor aging" such as hexamethylene tetramine, DPG, etc. Such a stock when exposed to sunlight or ultra-violet radiation will develop a dry yellowish surface which will under the influence of heat and pressure develop a bond to any metal, wood, glass, etc., that is not only integral, but thermosetting after the stock has cured. Adhesions to Dow metal, polished glass, etc., can be obtained as easily as to steel.

At the present time the methods of obtaining adhesions with rubber may be classified into five groups as follows:

1—Brass plating of metals.
2—Rubber and synthetic rubber derivative cements.
3—Synthetic resin cements.
4—Synthetic rubber base adhesives.
5—Miscellaneous chemical compounds.

Brass Plating of Metals

Prior to the war the use of brass plating for rubber adhesion was quite extensive embracing most of the motor mount applications, wringer rolls, industrial tires and numerous other mechanical goods items. During the war a large volume of bogie rollers and half-track clamps and cables were brass plated. At this time the principal advantages of brass plating were the formation of a heat-resisting bond, a time tested non-corrodable interface, and a surface treatment that would not slough off under the flow of the rubber compound. Increased use of cements not requiring brass plate has made the future importance of this method somewhat doubtful.

One of the considerations which has always weighed against the use of brass plate, in spite of excellent adhesion results under favorable circumstances, is the uncertainty about what constitutes quality in the plated metal and how to control the plating process so as to obtain the necessary quality. There are many recorded experiments on the effect of different variables on composition of brass plate, but the very number of important variables plus incomplete analytical and other data in many cases makes the task of correlation a difficult one. Variables to be considered include copper-zinc ratio, free cyanide, pH and alkalinity, ammonia, current density, agitation and temperature as well as the compounding of the rubber.

No attempt will be made here to discuss the compounding of rubber for brass adhesion, except to note some points of agreement from widely different sources. First, it seems to be agreed that particular brass compositions are suitable only for particular compounds. Next, it has been shown that sulfur is necessary to brass adhesion, and that acceleration and cure are important factors in adhesion. Apparently, a copper and sulfur reaction, somewhat in competition with vulcanization, is involved. The effect of aging of stock and use of certain softeners seems to be related largely to the condition of the surface of the stock at the time of bonding.

In some quarters, much stress has been laid on keeping the brass surface free from oxidation, but tests from different sources indicate that good adhesion can be obtained in some cases in spite of a little oxidation of the brass. Porosity in the base metal or porosity of the plate may lead to residual plating solution coming out of a metal surface and causing bad adhesion.

In general, the practice of rubber-brass bonding has dealt with the obtaining of a desired brass plate composition, the suitable compounding of the rubber, and the proper handling of the parts involved.

Rubber and Synthetic Rubber Derivative Cements

The most widely accepted materials under this classification have been the natural rubber isomers formed by reaction with phenol sulfonic acid or tin tetrachloride and the natural rubber addition products of chlorine or hydrogen chloride. Generally speaking the isomers or cyclization products are used with natural rubber and GR-S and the chlorine containing materials with neoprene and the Buna N types. Adhesions of the various rubbers to nearly all metals and a large variety of non-metallic ma-

terials can be obtained within this group of adhesives providing the surfaces are properly cleaned and roughened and ordinary care is taken on application of the adhesive prior to vulcanization.

The non-chlorine containing members of this group are generally not recommended for use in products that will require resistance to temperatures much over 160°-170°F., and as a result of their thermoplasticity can not be used in molded goods applications unless the mold is cooled prior to release of pressure. Experiments have shown, however, that the addition of small percentages of rubber chloride to certain of these cements will in effect produce a thermosetting bond. About 10% gives optimum results, a higher percentage tending to decrease adhesion to natural rubber.

Recent developments have shown that chlorinated polyisoprene and chlorinated GR-S can be used as well as the natural rubber chlorine containing derivatives.

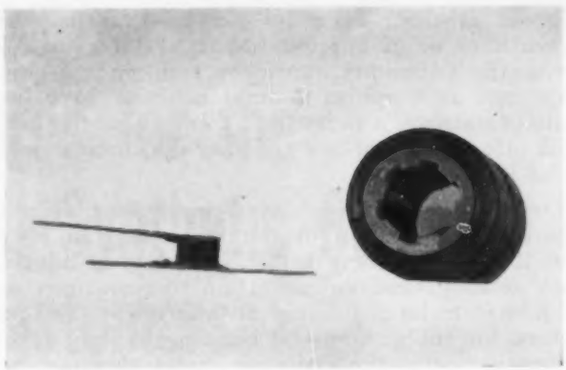
Synthetic Resin Cements

The use of phenol aldehyde cements as adhesives for the vulcanization of rubber to metals was patented as far back as 1917. Actually it is doubtful that the adhesions obtained were of much value since natural rubber bonds by such cements have never been extensively used if at all. Recent knowledge that certain phenolic resins, such as Durez 12687, appear to be compatible with natural rubber and GR-S would seem to indicate, however, that it would not be beyond the realm of reason to suspect that such bonds could be obtained.

Synthetic resin cements such as Bakelite BV1112 and Durez 12987 were used extensively during the war for the vulcanization of Buna N to steel and aluminum. This development was primarily activated by the necessity of finding an adhesive resistant to 40% aromatic fuels for use in fabrication of aircraft fuel tank fittings. Production of these molded fittings probably approached a total of ten million units with a record of practically 100% freedom from adhesion failures in service. Application of this type of adhesive is relatively simple although some experimentation is generally desirable to establish the proper drying or baking time prior to application of the rubber to be vulcanized. This baking time must be long enough to partially react the resin to the point where it will not flow under application of heat and the frictional forces of the rubber under pressure, and yet must still retain sufficient reactivity to produce integral bonds. Present indications point to the relatively wide use of these phenolic type adhesives for Buna N and neoprene molded goods items where good chemical resistant as well as heat resistant bonds are required.

Synthetic Rubber Base Adhesives

With the development of the various types of synthetic rubbers the possibilities open to the rubber technologist in adhesive formulations have increased enormously. None of the available rubbers are in themselves of much value, but by proper blending with chlorinated rubbers or synthetic or natural resins, adhesives suitable for a wide variety of uses have been formulated. In this connection it might be noted that by the blending of chlorinated



LEFT: Adhesion on this small mounting for a helicopter was obtained by thoroughly cleaning the metal by sand blasting and then coating the adhesion surface with a thin coat of a phenolic resin type cement to which a Buna N compound is bonded. RIGHT: This is a zinc die cast metal spline used in a washing machine gyrator the adhesion on which was accomplished by first coating with a chlorinated rubber type cement.

rubber cements to Buna N cements the storage or shelf life of the Buna N cement is said to be increased as well as its adhesive value.

The chief deficiency of the synthetics, namely the lack of tack, can be overcome by various natural resins and synthetics including certain thermosetting types. These not only improve the tack, but also by proper choice can be used to produce blends suitable for many different applications such as adhesives for textiles, wood, etc. These blends have not, however, been too extensively used for adhesion of rubbers to other materials.

Miscellaneous Chemical Compounds

Several years ago the fact that polyisocyanates improved the adhesion of rubber to textiles of various sorts was discovered by DuPont. Since that time considerable development work has been done both by DuPont and other companies which resulted in the use of methylene diphenyl diisocyanates (MDI) as a pre-dip for nylon in airplane tires. Buna N cements containing MDI were also used during the war to promote adhesion of nylon film to Buna N, the resulting composite serving as an inner liner for self-sealing fuel tanks. Several patents have since been issued disclosing the addition of isocyanates to synthetic rubber cements which serve as good rubber to metal adhesives, and the addition of isocyanates to rubber isomer cements which results in a greatly reduced thermoplasticity of these rubber-to-metal bonding agents.

Since the end of the war several German technical documents which originated in the Leverkusen laboratories of I.G. have revealed widespread use of the triisocyanate of tri-amino tri-phenyl methane which was known as Desmodur R. This material was probably first used in Germany as a rubber-to-metal adhesive and later, as the proteins used in tire fabric dips became scarce, it was used with improved results as an adhesive for cotton and synthetic cords in tires as well as in life raft and

raincoat fabrics. Tests in our laboratories have shown it to be of approximate equal value to MD1 for textile adhesions to rubber and, since preliminary tests as a rubber-to-metal adhesive have been quite promising, it is felt that a review of the pertinent information of the German documents might be of interest.

Desmodur R is used as a methylene chloride solution which upon evaporation yields a sticky film that dries slowly in air. The film is odorless both at room and vulcanization temperatures and is claimed to be physiologically harmless. The procedure for rubber-to-metal bonding is very simple embracing only the ordinary metal cleaning procedures such as pickling or sandblasting, application of one coat of the adhesive solution by brush or spray, drying approximately fifteen minutes and applying the rubber with a solvent freshened surface followed by vulcanization. The danger of wiping off of the adhesive film from rubber flow before vulcanization is said to be slight because of its good adherence to the metal and the fact that a very thin film will still give good adhesions. As a precautionary measure, however, the addition of about twenty parts of chlorinated rubber to the Desmodur is recommended and this will increase the adhesion values as well.

Advantages claimed for Desmodur R bonds include (1) simplest procedure and easy adaptation in the usual manufacturing process, (2) good adhesion values at both low and high temperatures (150°C. and over), (3) effective for all types of synthetic rubbers as well as natural rubber, (4) equally satisfactory for all types of iron and steel and the light metals, (5) not influenced by compounding thus avoiding the necessity of tie-gums, (6) stable bonds to oils, fuels, aromatics, etc., and (7) satisfactory storage life before vulcanization. Disadvantages of Desmodur R solutions result from its high reactivity, being readily decomposed by water, alcohols, acids, etc. It must be very carefully handled in stoppered glass or stainless steel containers and the solutions being used must not be returned to the storage container.

Results in our laboratories have shown that the Desmodur R solution as obtained from Germany gives good metal bonds with GR-S and natural rubber, but mediocre results with Buna N and neoprene stocks. However, with the addition of twenty parts of chlorinated rubber as recommended good results were obtained with all four types of rubbers. Whether a good fool-proof adhesive suitable for all types of rubbers, a result long sought after, can be developed with the aid of isocyanates still remains to be proven.

Desirable Properties of Adhesives

The desirable properties of adhesives for rubber are well known and need not be discussed. No attempt has been made to outline the bond strengths that may be obtained by the various types of bonding mediums with the available rubbers since, in a general discussion of this nature, the pounds per square inch obtainable in tension or shear or the pounds per inch in the strip test would be of little value without a complete description of the physical properties of the rubber compound itself. For example, a good adhesion with a tread stock compound of natural rubber should approach or exceed 1000 lbs./sq. in. in tension whereas a pure gum adhesion would be considered satisfactory at around 300 lbs./sq. in. In both cases the adhesive forces would exceed the cohesive forces, with failure substantially within the rubber. Actually the art of bonding rubbers to other materials has advanced to the point where an adhesive or bonding medium is no longer worthy of the name unless an integral union is secured.

The various methods of obtaining rubber adhesions which have been discussed will produce integral unions with one or more of the different types of rubbers providing the fundamental principles involved in each particular case are adhered to. None of the methods are fool-proof in the factory without careful supervision, some vary with climatic conditions, others are too dependent upon age, fresh stock and similar minor irritants. In common with most technological fields of endeavor tremendous progress has been made during the last five years, but research must be continued to keep pace with the new elastomers that are being developed and to simplify and improve present methods.

Experiments with Anti-Bacterial Rubber

IN A PAPER recently read before the French Academy of Science, according to a recent issue of the *India-Rubber Journal*, Professor Jacques Risler described research undertaken in collaboration with the French Rubber Institute. The aim was to produce an antiseptic rubber, which was at the same time an insecticide, as part of a general hygiene plan to sterilize homes and furniture.

Rubber had been chosen rather than any other substance because of its wide application, but at first the difficulties appeared insurmountable, the chief of these being the high temperature at time of vulcanization. Eventually, however, a crystalline form was found which was soluble in rubber at the moment of vulcanization, but which reverted to solid when the rubber cooled and took the form of a thin layer of bactericide only one or two millimeters in thickness. All bacteria coming in contact with this layer were destroyed in less than five minutes.

The goal was attained by incorporating with the pure rubber mixture a base of standard para-isopropylmetacresol in the form of crystals. Tests made with various bacilli showed that the impregnated rubber was potent even after 212 days of trial, destroying the bacilli in scarcely varying time from that of the first day.

The success of the experiment, it is claimed, opens up possibilities of a very wide application of the idea. Among the many products which can easily be treated are bitumen latex for lining roads, carpets, shoes, soles, cushions, mattresses, rubber seats, waterproof sheets, telephones, etc. Research on the question is still going on.

Developments in the Field of Testing Procedures for the Evaluation of Natural and Synthetic Rubbers and Plastic Elastomers

Sponsored by Bureau of Ships, Navy Department

Part II

By THEODORE A. WERKENTHIN

Principal Materials Engineer, Bureau of Ships, Navy Department, Washington, D. C.

LOW TEMPERATURE TESTS

With the advent of the extensive use of synthetic rubber and the manufacture of various types of hose, which had formerly used only natural rubber, a number of complications were introduced which had to be met by the development of methods which would evaluate the peculiar properties of synthetic rubber. A very important property is the flexibility of hose materials.

Flexibility Test for Welding Hose: One of the first tests developed was used in connection with welding hose. A section of the welding hose approximately 12 inches long is fastened securely at one end, and the other end is attached by means of a string and series of pulleys to a pan which is supplied with weights. The hose is then subjected for a considerable length of time to the desired low temperature by means of immersing in an alcohol bath, which is cooled by the addition of solid particles of carbon dioxide. After the hose has been subjected to the desired temperature, weights are added to the pan to determine the force required to deflect the hose from the horizontal a certain degree. The equipment used by the Material Laboratory, Navy Yard, New York, is shown in Figs. 13 and 14.

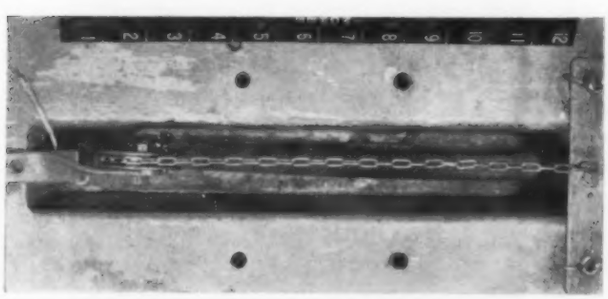


FIG. 13—Flexibility test of welding hose at low temperature.

This same test was found suitable for both approval testing and inspection testing, and has been in use in Navy Department Specification 33H7 for several years. The hose was considered acceptable if a four ounce weight deflected it 5/8" at 80°F. and 1/4" at —20°F. Similarly, a 12 ounce load would deflect the hose 2 1/4" at 80°F. and 1" at —20°F. Hose procured with this test has performed satisfactorily even in cold weather operations in shipyards.

Constant Angle Deflection Flexibility Test: An improvement of this simple test was made by the Industrial Laboratory, Navy Yard, Mare Island, in which a lever arrangement was made having such curvature that the pull on the hose or on a strip of gasket would always be at a 90° angle. This apparatus is illustrated in Figs. 15 and 16. It has, however, been found more expedient to lengthen the string to which the hose or gasket strip is attached in order that the angle made by the string and the sample piece becomes negligible. Thus it will be seen that test methods undergo constant improvement and simplification wherever possible.

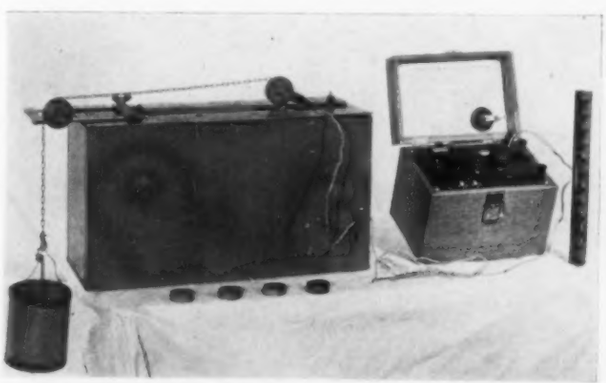


FIG. 14—Apparatus for making low temperature flexibility tests of welding hose.

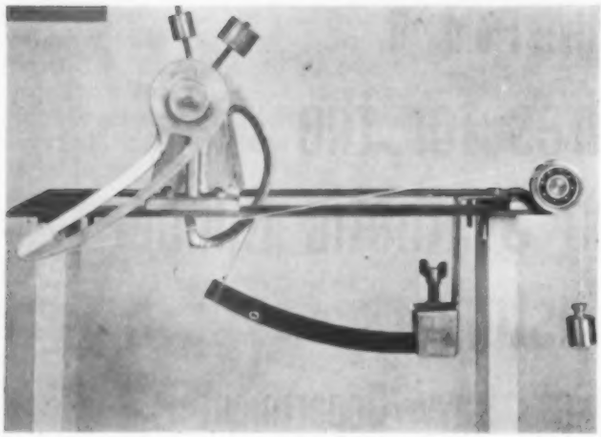


FIG. 15—Constant angle deflection flexibility test showing mechanism.

FIG. 16 — Constant angle deflection flexibility tester assembled.

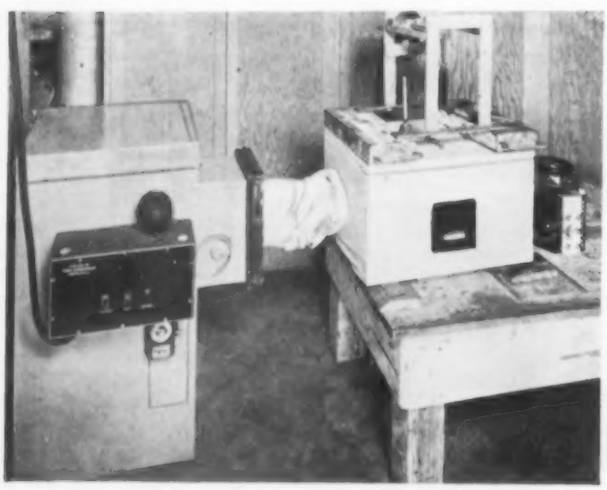


FIG. 17—Werkenthin flexibility test for gaskets showing complete assembly.

Werkenthin Flexibility Test for Gaskets: A flexibility test for hose and gasket material at low temperature which combines simplicity of apparatus with accuracy of results is shown in Figs. 17 to 21, inclusive. This test is now required in several Navy Department specifications, such as 33H31, Bureau of Ships Specification 33R9, and others. The sample used in this test consists of a strip of rubber to be tested, ½" thick by 2" wide and 10" long. The sample is attached firmly at one end by means of a clamp; a string passing through a hole at the other end is 8" from the point of attachment. This string passes out of the cold box and is fastened to a hook which in turn is fastened to a spring balance. The spring balance is elevated by a manually or machine driven pulley device so that the lift will be at the rate of 1" per minute.

After a conditioning period of three hours, an upward force is applied to the specimen via the spring scale and string at the rate of 1" per minute after applying an initial load just sufficient to take up the slack

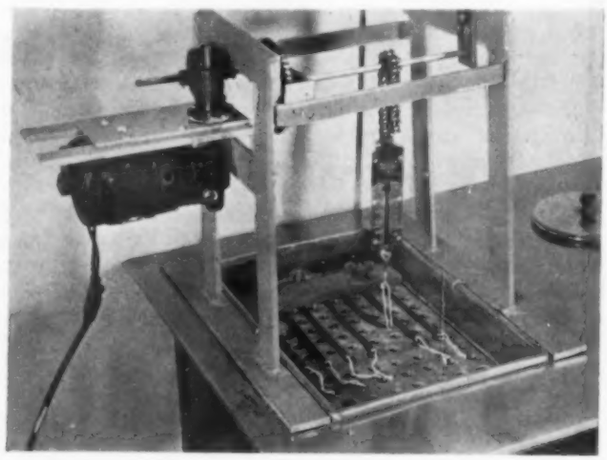


FIG. 18—Werkenthin flexibility apparatus showing details of attachment of sample to scale and automatic elevator mechanism.

FIG. 19—Cold box showing hand operated elevator mechanism.

in the cord. The force to deflect the specimen 1" and 2", respectively, is recorded as the flexibility. Suitable material used in hose cover stock and hose tube stock has been found to require a force of 85 grams to deflect 1" and 150 grams to cause 2" deflections at —20°F. Two variations of the flexibility tester are seen in Figs. 17 and 19.

Brittleness Test in Liquid Medium: Sometimes, instead of measuring the pliability or flexibility, it is desirable to obtain an accurate estimate of the brittleness of a material of synthetic rubber or plastic elastomer. For this purpose two tests have been developed. One of them is a brittleness test in which the rubber specimen is submerged in a liquid. This test was developed by the Rubber Laboratory, Navy Yard, Mare Island, and was a modification of the Selker, Winspear & Kemp test*. The functioning of this apparatus was discussed in detail** and is illustrated in Figs. 22 and 23. One disadvantage of this apparatus is that the methyl alcohol and carbon dioxide snow used as a cooling medium may have a leaching effect on the rubber or synthetic rubber, which may give misleading results as to the flexibility of the materials at various temperatures. While the apparatus is provided for the use of seven specimens, it was found in actual practice desirable to use only one specimen at a time in order that the maximum velocity of impact would be reached in determining the brittleness.

* Selker, Winspear & Kemp, "Brittle Point of Rubber on Freezing," *Rub. Chem. & Tech.*, Vol. 15, No. 2, pp. 243-50 (Apr., 1942).

** Morris, James & Werkenthin, "Brittle Points of Natural and Synthetic Rubber Stocks," *Ind. Eng. Chem.*, Vol. 35, No. 8, pp. 864-67 (Aug., 1943).

† Chatten, Eller & Werkenthin, "Determination of Brittle Point of Rubber Materials in Cold Air," *R. A. (N. Y.)*, Vol. 54, No. 5, pp. 429-32 (Feb., 1944).

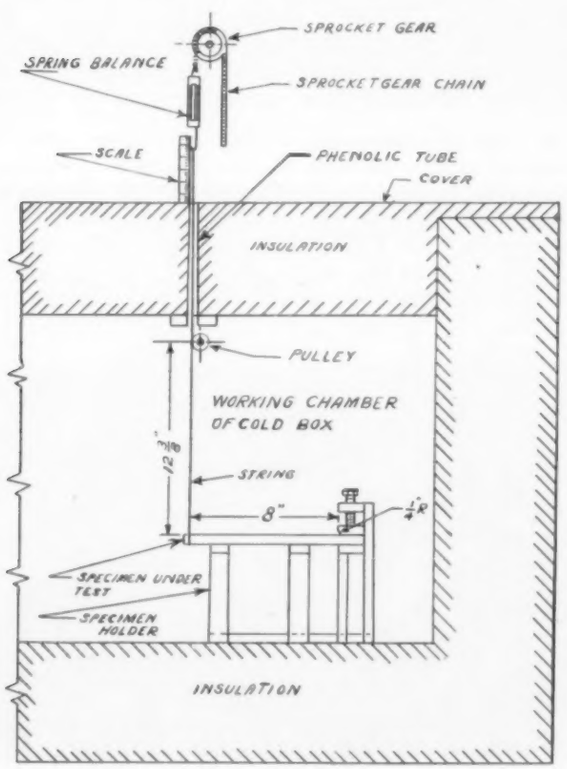


FIG. 20—Schematic diagram showing essential dimensions of set-up.

Brittleness Test in Cold Air: To overcome these disadvantages, the Material Laboratory, Navy Yard, New York, developed a brittleness tester in which the specimen would be cooled by air instead of in a liquid medium, and, in addition, the material impact was controlled by a hammer of definite weight touching the rubber specimen at precisely the same angle and at the same rate of speed. This apparatus and technique was described in detail by Chatten, Eller, and Werkenthin.†

The essential parts of the brittle point apparatus are the specimen jig (Fig. 24), designed to accommodate twelve test specimens, and a pendulum hammer for striking the specimens. The specimen jig is secured to a shaft which is connected to a control panel mounted outside of the cabinet. The control panel is

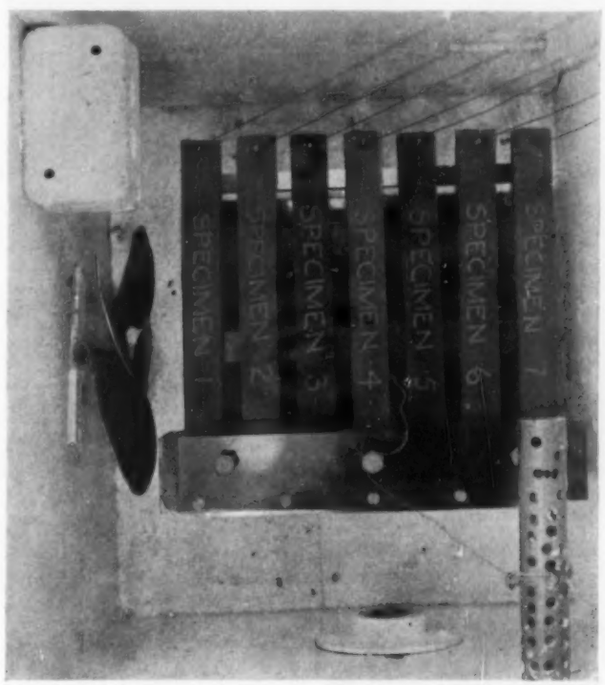


FIG. 21—Interior view of cold box showing specimens in position for flexibility test.

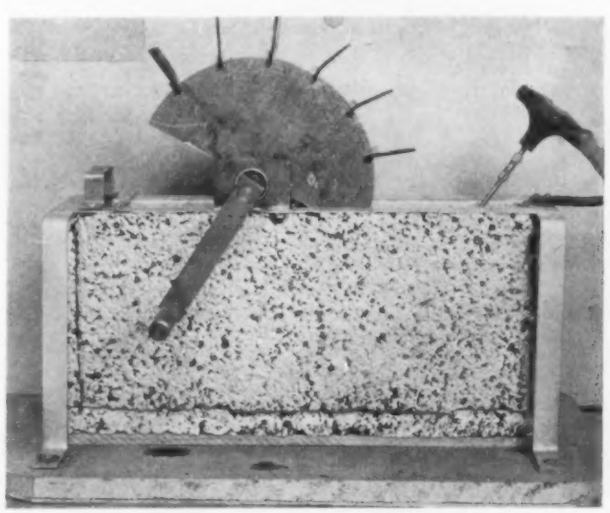


FIG. 22—Brittleness point apparatus.

stamped with numbers to correspond with the numbers of the specimens secured in the jig. The specimen to be tested is brought into position by revolving the shaft. A pin (Fig. 25), lug setting into the control panel, secures the shaft in the selected position. The pendulum hammer is made of steel and is supported by a shaft mounted directly above the specimen jig. The hammer is 3" long, 3" high, and 2" wide, and has a leading edge rounded to a radius of 1". This edge is the one that comes in contact with the rubber specimen.

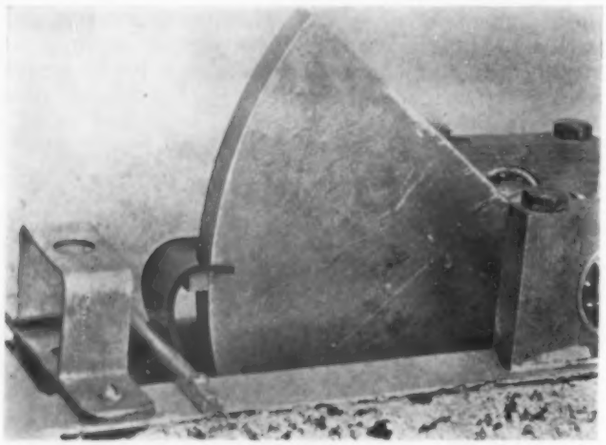


FIG. 23—Brittleness tester close-up showing specimen being bent.

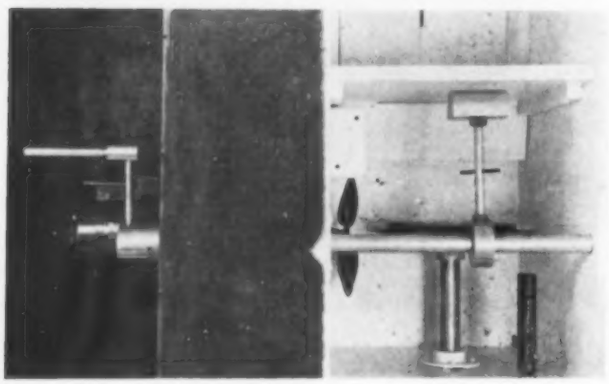


FIG. 24—Air cooled brittle point apparatus showing hammer positioned for impact blow.

The reproducibility of tests using this method is very good. The brittleness may usually be determined accurately to within plus or minus ½°F. Recently, improvements were made by attaching weights to the handle (Fig. 26), so that the force of impact can be exactly controlled and another human factor is eliminated. This apparatus has the additional advantage that the same box may be used for the determination of flexibility by the Werkenthin method described above.

Rex and Shore Hardness at Low Temperatures: This same apparatus, by slight modification as indicated in Figs. 27 and 28, can be used for determining Rex hardness or Shore durometer hardness at desired low temperatures. The equipment, as will be seen, requires only minor modification and is, therefore, suitable for determining flexibility, brittleness, and hardness, and is one of the best illustrations of the advantages of careful planning which results in economy of equipment and simplicity of method.

Elongation Test at Low Temperature: In addition to determining brittleness or flexibility, it frequently is desirable to measure stiffness or elongation at various temperatures and under various loads. This test was developed by the Rubber Laboratory, Navy Yard, Mare Island.* The apparatus is shown in Fig. 29. The specimen used in this determination is the same specimen used in the T-50 test. Since this is a very small sample, it is possible to conduct the test on actual sections of small hose, gaskets or other rubber articles. It has the same advantage as the New York test in that it utilizes air as a cooling medium instead of a liquid. By a variation of the circulating air medium, the same apparatus may be used for the determination of plastic flow or drift of rubber or synthetic rubber.

It appears unfortunate that so many different methods have to be used in the evaluation of the various properties of synthetic rubbers at below room temperature, but as will be readily seen, each of the methods described above has a special application and

* Morris, James & Evans, "A Low Temperature Stiffness Test for Elastomers," *I. R. W.*, Vol. 110, No. 5, pp. 529-32 (Aug., 1944).

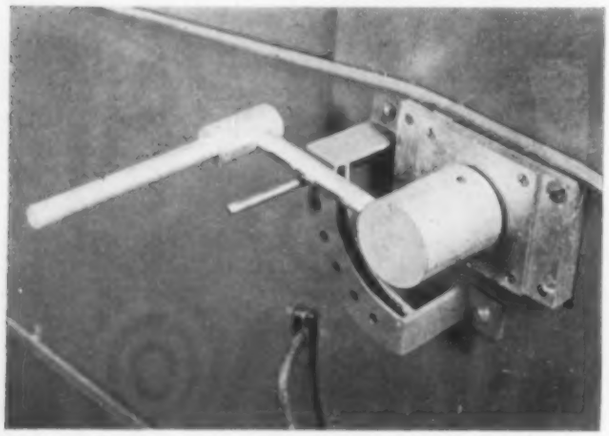


FIG. 25—Control for releasing hammer.

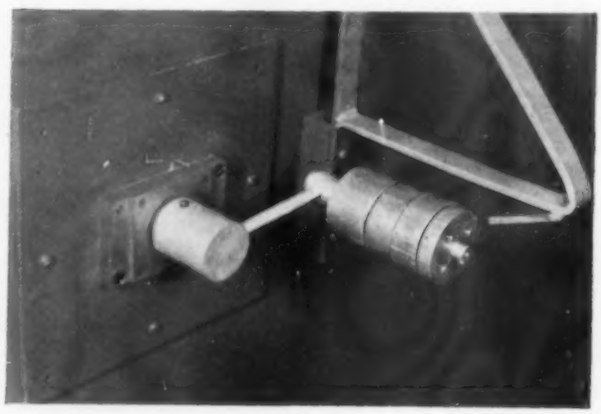


FIG. 26—Lead weights for increasing impact energy of hammer.

is suitable for special classes of material. Investigations are now underway, the purpose of which is to study each of the low temperature procedures and to evolve a minimum number of procedures which will embody all the good characteristics of the several methods. The cost of the apparatus, the ease of conducting the test, the time required for test and the size of the sample—all are of considerable importance in evaluating the several methods of test.

Ball Drop Test: In evaluating the cold resistance of flame sprayed coatings, such as those procured under Navy Department Specification 52C24, a simple ball drop test has been developed. A typical setup for this test is shown in Fig. 30. The apparatus for the test consists of a steel ball, 1" plus or minus 1/16" in diameter, weighing 66.5 to 67.5 grams. The ball is dropped from the height of 20 inches when a temperature of 60°F. is used, and generally ten determinations are made at various places on the surface. Where the temperature of testing is 0°F., a lesser distance is generally employed, usually 5 inches. The evaluation of the covering is made by determining whether or not the coating has been ruptured by the impact, to the extent where a 20,000 volt high frequency spark tester will not show up any cracks, pin holes or imperfections. This test can be conducted either on a test jig sprayed simultaneously with a shaft coating or can be made by chilling a section of the shaft with a block of carbon dioxide snow. Where a jig is used, a conditioning period of three hours prior to the time of test is usually employed.

Pendulum Impact Test: Where the ball drop test is conducted on a jig instead of on the shafting itself, the arrangement shown in Fig. 31 is used. A modification of the ball impact test developed by the author was a pendulum impact. The equipment for this is shown in Fig. 32. A small hook is soldered to a 1" steel ball bearing and the bearing suspended by a string from a support above the jig. The 45° angle of fall was a

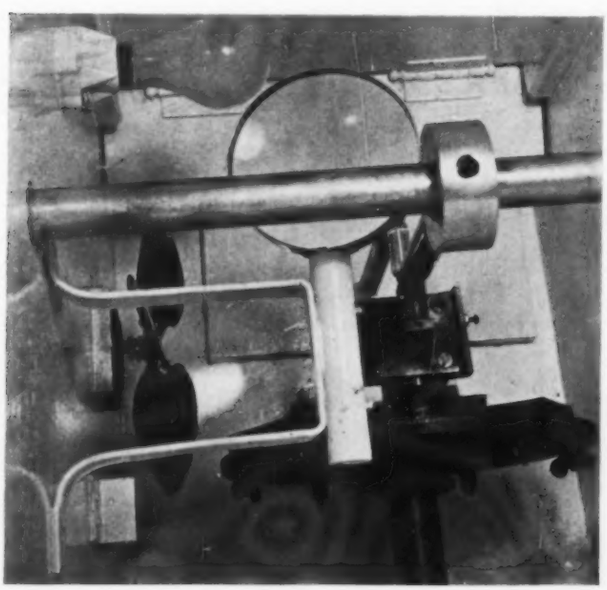


FIG. 27—Interior view of cold box showing set-up for Rex gauge hardness test.

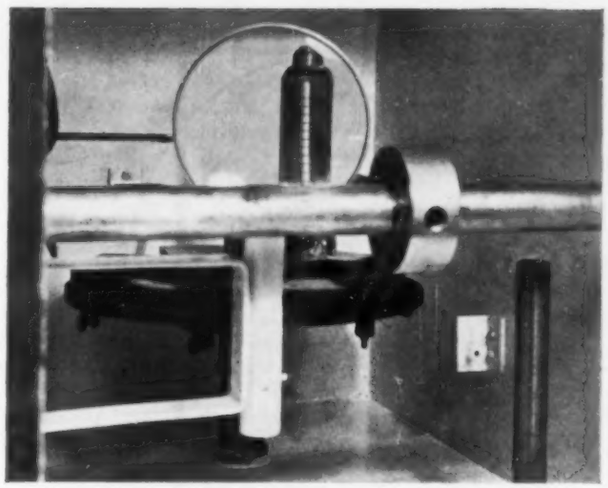


FIG 28—Scale of Rex gauge with magnifying glass interposed for magnification of readings.

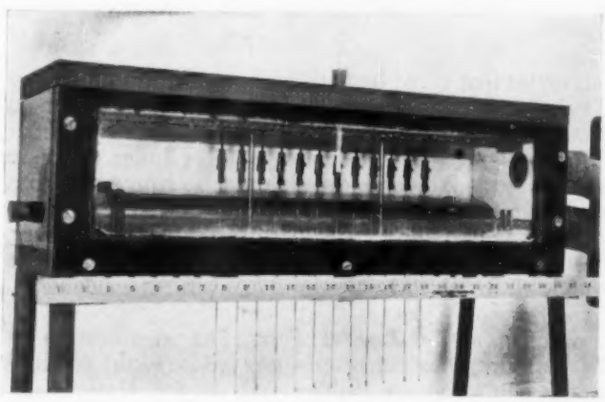


FIG. 29—Apparatus for elongation test at low temperature.

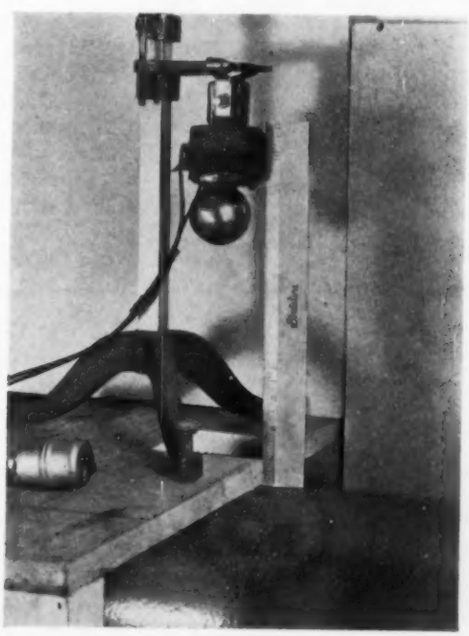


FIG. 30—Method of testing propeller shaft covering for impact resistance using 2-inch steel ball bearing.

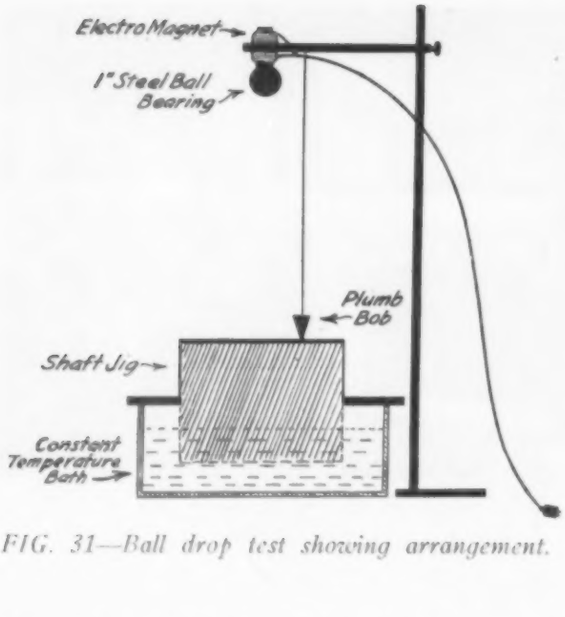


FIG. 31—Ball drop test showing arrangement.

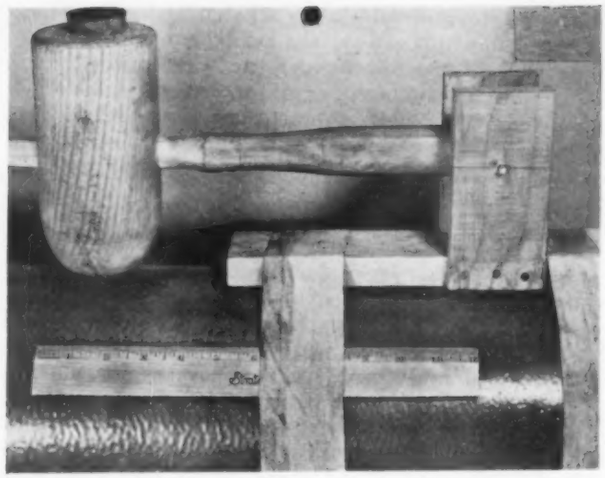


FIG. 33—Method of testing sprayed Thiokol propeller shaft covering for impact resistance using weighted wooden mallet.

maximum that could be used without introducing errors in calculations. Assuming that the pendulum acts as a frictionless inclined plane, it was determined that a 15" drop would be equivalent to a pendulum 51.2" in length, and a 20" free drop would be equivalent to a pendulum 68.3" long. This modification has some advantages where ample freeboard is available; however, the ball drop test using the magnetic control has been found, all in all, to be the most convenient method.

Wooden Mallet Impact Test: The modification of the ball drop test on flame-sprayed organic coatings was developed at the Rubber Laboratory, Navy Yard, Mare Island. This equipment is shown in Fig. 33. The wooden mallet has a hole drilled two-thirds of the way which can be loaded with lead shot to any desired weight. This test is not nearly as severe as the steel ball impact test and has not been perfected for the reason that for the purpose intended—for evaluating different types of flame-sprayed organic coatings on shafting—it was not sufficiently severe. However, this test may be found of interest in connection with other types of materials where the resistance to impact, even at low temperatures, is not required to be as high as for shaft coatings. This test may be modified by substituting a cylindrical piece of lead for the wooden mallet and attaching thereto a tip having the desired hardness, made of either hardwood or steel.

Cold Compression Set Test: The necessity for determining compression set of natural and synthetic rubber at temperatures below room temperatures was indicated by the behavior of neoprene gaskets in various installations aboard ship. Morris, Hollister, and Mallard of

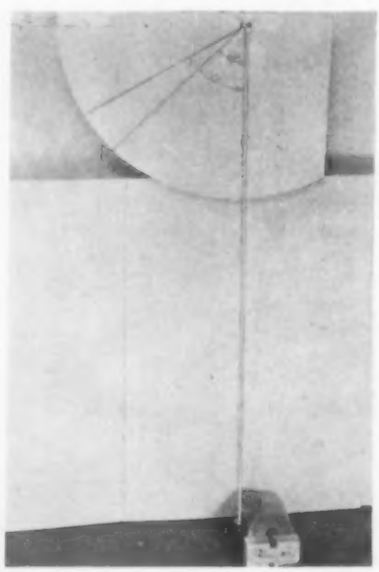


FIG. 32—Apparatus for testing Thiokol propeller shaft covering for impact resistance using a pendulum.

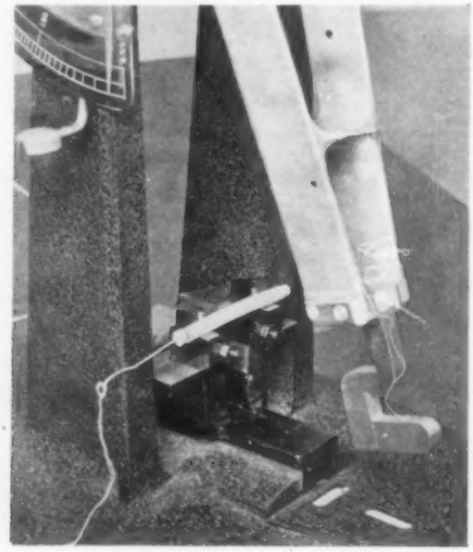


FIG. 34—Plastic tube impact tester at low temperatures.

the Rubber Laboratory, Navy Yard, Mare Island, give the details of conducting this test and the apparatus used.* It is necessary here only to mention that the procedure follows A.S.T.M. standard practice,** except for the apparatus required to obtain the desired low temperatures. It is entirely probable that in the future a good many of the tests which are now conducted at elevated temperatures and at room temperatures will have to be repeated at low temperatures, ranging from —20°F. to —80°F. The reason that this has not been done sooner is due to the peculiar property of natural rubber—to be remarkably flexible, resilient, and soft at cold temperatures.

* Morris, Hollister & Mallard, "The Cold Compression Sets of Natural and Synthetic Vulcanizates," *I.R.W.*, Vol. 112, No. 4, pp. 455-58 (July, 1945).
** ASTM Designation D395-40T, Method B.
† ASTM Methods of Test for Impact Resistance of Electrical Insulating Material (D256-41T); Morris, Mitton, Seegman & Werkenthin, "The Compounding of Hard GR-S," *R.A. (N.Y.)*, Vol. 54, No. 2, pp. 129-33 (Nov., 1943).

Plastic Tubing Impact Test at Low Temperatures: An illustration of using standard equipment and adapting it to serve new purposes is the low temperature impact test on plastic tubing, using the A.S.T.M. method for Impact Resistance of Electrical Insulating Material using a Charpy Impact Tester.† A specimen of plastic tube to be tested is placed in a dry ice methanol bath at the desired temperature and held there until the thermocouple on the interior of the specimen registers the same temperature as that of the bath. When the specimen has been cooled to the testing temperature, it is removed from the bath, placed on the supports of the impact tester (as shown in Fig. 34), and tested as rapidly as possible. The highest temperature at which the specimen shatters, regardless of the residual force of the pendulum, is recorded as the brittle point.

(To Be Continued)

Vulcanization of GR-S by the Peachey Process

By ARCHIBALD T. McPHERSON
National Bureau of Standards, Washington, D. C.

IT HAS been found possible to vulcanize GR-S synthetic rubber by subjecting it alternately to hydrogen sulfide and sulfur dioxide gases. This method for curing, known as the Peachey Process,* has been used for natural rubber as long ago as 1921.

A simple apparatus was constructed in which strips of thinly-milled rubber were placed on a screen inside a glass tube. One end of this tube was attached to valves connecting it respectively to tanks of hydrogen sulfide, sulfur dioxide, and air. The other end of the tube led to a series of traps containing solutions which would absorb or destroy the gases.

For each test performed, natural rubber samples were placed inside the tube along with the GR-S samples for comparison. Each strip was weighed before it was inserted into the apparatus. Hydrogen sulfide was first slowly passed over the samples for a period of five minutes. Then air was blown through for a few seconds—just long enough to free the surroundings from the sulfide gas, but not long enough for the gas to be lost from solution in the rubber. Sulfur dioxide gas was next admitted and allowed to pass over the samples for five minutes. A subsequent short sweep of air through the tube completed one cycle of the curing process.

Tests were made on both the natural rubber and the GR-S samples from one cycle of operation to twenty-four cycles. After the samples had been removed from the apparatus and allowed to stand until equilibrium weight had been established at room conditions they were weighed. The increase in weight was assumed to be chiefly sulfur, both in the free and the combined forms. Hand-stretching was performed on the samples to determine the state of cure. The results can be summarized in the accompanying table.

* Peachey, S. J., and Skipsey, A., "New Process for the Vulcanization of Rubber," *J. Soc. Chem. Ind.*, Vol. 40, 5T (1921).

It can be seen from the table that the GR-S vulcanizes much more slowly than the natural rubber by the Peachey Process. However, it was possible to get an optimum cure and even an overcure with the GR-S by this process.

At my suggestion, my associates, Norman Bekkedahl and Fred A. Quinn, made the simple exploratory experiments described in this note. They are proceeding with a more thorough study.

	Natural Rubber		GR-S	
No. of Cycles	Increase in Weight (%)	State of Cure	Increase in Weight (%)	State of Cure
1	1.2	Slight undercure	0.2	None
2	3.5	Optimum cure	0.4	None
3	6.6	Slight overcure	0.8	Noticeable
4	7.0	Slight overcure	1.0	Noticeable
6	10.0	Considerable overcure	2.4	Slight undercure
12	11.8	Leather-like	4.2	Optimum cure
24	13.0	Leather-like	9.7	Slight overcure

Editorials . . . . . .

Plant Disposal

JUST as this issue was going to press an interim report was submitted by the Inter-Agency Policy Committee on Rubber to the Office of War Mobilization and Reconversion on the disposal of the government-owned butadiene and copolymer plants. Previously, as reported elsewhere in this issue, a report was made to Congress by the War Assets Administration recommending the early disposal, by sale or lease, of ten specialized plants. The latter recommendation was based on suggestions contained in the initial report of the Policy Committee, outlined in our April, 1946, issue. The specialized plants included those devoted to the manufacture of butyl, neoprene, styrene, furfural and carbon black.

The over-all disposal program of synthetic rubber raw materials and copolymerization plants, as outlined in the two specific reports mentioned above, is clear-cut and is in keeping with the thinking of rubber executives in this country. For example, the specialty plants can be sold outright to private operators at any time and would be subject to special conditions of sale which would apply only during the scarcity of natural rubber. The butadiene and copolymer plants would be sold on the understanding that (a) they would be kept in synthetic rubber production during the rubber shortage, subject to government control, and (b) at no time would they be altered in such a way that would not permit their reconversion to synthetic rubber production. If these two conditions are not met, the government could reacquire the plants.

In other words, national security is assured despite disposal of the synthetic rubber plants to private interests. No potential purchaser will object to such terms of sale. Following this line of thought, the framers of the recommendations for the disposal of the butadiene and copolymer plants went one step further. They divided the 15 polymer plants and the 10 large petroleum butadiene plants into "fringe" and "basic" plants, the fringe plants being those which in all likelihood will not be required for synthetic rubber production or stand-by capacity, either because of high production cost or location or both, and the basic plants being those most needed either in production or stand-by for the long run synthetic rubber program because of low cost operation and favorable location and "because they utilize different feedstocks and embody diversified engineering principles which it is desirable to maintain in the interest of a well-balanced program."

Other proposals recommended by the Policy Committee include flexible terms which would permit purchasers to turn the plants back to the government "without undue loss" during the initial period of ownership; payments spread over a five to ten year period; assurance that purchasers of basic plants are qualified to operate them; acceptance of bids not later than the end of the current year; and continued maintenance in stand-by condition of at least one alcohol-butadiene plant.

The fact that the operation of the specialty plants, particularly those devoted to the production of butyl and neoprene, presents legal complications and that the purchasers of such plants would be faced with patent problems was not overlooked in either of the recommendation reports made by the Policy Committee. The report devoted to disposal of the specialty plants was accompanied by a statement outlining some of the obvious complications facing prospective purchasers. Obviously, Standard Oil holds a strong patent position in the butyl field and DuPont in that of neoprene. The probability is quite strong that these concerns will take over the government butyl and neoprene facilities, unless the Department of Justice blocks their offers on the issue of monopoly.

Rubber Prices

WITHIN the next two weeks a decision will be reached on the price which the United States is to pay for natural rubber supplied by the British, Dutch and French. The present agreements, under which the United States pays 20¼ cents per pound, expire on June 30 and negotiations are currently being conducted in London on new agreements. Planters in the Far East, particularly those in Malaya, have been most discontented with the present price, and there is no doubt that the new agreements will provide for a higher price. Although British planters have been clamoring for a price around 35 cents per pound the American representatives will not agree to any price in excess of 25 cents a pound. The likelihood is that the new price will be in the 22 to 24 cent range, with the United States continuing to sell natural rubber to domestic consumers for 22½ cents a pound, absorbing the differential for the length of the new agreements, which will probably extend for only three to six months. Should the British insist on a price of more than 25 cents a pound, it is quite probable that the present agreements will expire without renewal. Despite the tightness in supplies of GR-S this country can get along for many months without additional natural rubber imports if it must.

CURRENT NEWS OF THE MONTH

EARLY DISPOSAL OF SPECIALIZED PLANTS IS PROPOSED IN WAA REPORT TO CONGRESS

EARLY DISPOSAL of 10 specialized plants used in the wartime synthetic rubber program was proposed in a report submitted to Congress on June 10 by the War Assets Administration. The plants, aggregating a government investment of $182,000,000, represent more than one fourth of the government synthetic rubber plants costing more than $5,000,000 and also more than one fourth of the total government investment in such plants. They represent the entire butyl rubber capacity of the country, more than 90% of the styrene capacity, 86% of neoprene, 66% of furfural and 8% of carbon black.

The proposal for early disposition was advanced in a report which took cognizance of the anti-trust aspects involved by stating that "special attention will be given to offers which afford prospect of introducing competition in the fields of neoprene, butyl, and furfural production."

Specifically, WAA intends to take these steps, unless the program is amended by Congress within 30 days:

Steps to Be Taken by WAA

1. The plants will be offered immediately and their availability given wide publicity. Preliminary negotiations will be carried on with potential purchasers or lessees after which a cut-off date for bids for plants in each category will be set.

2. Efforts will be made to sell the plants, but leases will be considered where sale on acceptable terms is not possible, "or where leases promise more fully to promote the objectives of the Surplus Property Act."

3. Sales or leases will, where necessary, be subject to conditions laid down by the owning agency to assure an adequate supply of synthetic rubber while natural rubber continues to remain in short supply.

4. During preliminary negotiations for butyl, neoprene and furfural plants, "special attention will be given to the possibility of disposal to other than the present operators to avoid establishing the latter as sole producers." Should it develop that present operators offer the most favorable bids, final disposal will be subject to Justice Department approval, WAA pointed out.

5. WAA will request the Office of Rubber Reserve to advise or assist purchasers or lessees in acquiring patent rights.

The type of plant covered by the agency's report, their operator, and approximate cost, with the annual design capacity indicated in parentheses, were:

Butyl—Standard Oil Company of New Jersey, Baton Rouge, La., $25,900,000 (38,000 long tons); Humble Oil & Refining Co., Baytown, Tex., $25,900,000 (30,000 long tons).

Neoprene—E. I. du Pont de Nemours & Co., Louisville, Ky., $38,400,000 (60,000 long tons).

Styrene—Carbide & Carbon Chemical Co., Institute, W. Va., $9,800,000 (25,000 short tons); Dow Chemical Co., Los Angeles, Calif., $12,600,000 (25,000 short tons); Dow Chemical Co., Velasco, Tex., $17,800,000 (50,000 short tons); Koppers Co., Inc., Kobuta, Penna., $18,800,000 (37,500 short tons); Monsanto Chemical Co., Texas City, Tex., $18,300,000 (50,000 short tons).

Chemicals, Furfural—Q. O. Chemical Co., Memphis Tenn., $5,000,000 (24,000,000 pounds).

Carbon Black—United Carbon Co., Odessa, Tex., $9,500,000 (41,000,000 pounds). Note: The Government owns five other carbon black plants, each of which cost less than $5,000,000, which are also recommended for disposal.

The plants involved in this program represent only a part of the Government's synthetic rubber holdings. A further report on disposal will be presented to Congress at a later date to cover the remaining plants, which include all the facilities except styrene in the GR-S program (alcohol butadiene plants, petroleum butadiene plants, and copolymerization plants, representing a Government investment of $488,000,000).

(EDITOR'S NOTE: One of the GR-S copolymerization plants—that operated at Louisville Kentucky, by the B. F. Goodrich Chemical Co.—has already been publicly offered for sale, as reported elsewhere in this issue.)

Patents and Anti-Trust Aspects

For the question of patents and anti-trust aspects of disposal, the WAA report points out that "virtually complete patent control" for butyl rubber is vested in the Standard Oil Co. (New Jersey), which financed and conducted all research on the product during the war.

For neoprene, the WAA declared that it is a "du Pont process and virtually all patents in this field are controlled by the du Pont Co. If the plant were to be acquired by du Pont, that company would occupy the position of sole producer of neoprene. Whether this position would be permissible is a question for review by the Department of Justice."

In the case of furfural, which is produced only by a subsidiary of the Quaker Oats Co., WAA stated again that "any disposal arrangement with the present operator would raise a question for the Department of Justice by reason of placing him in the position of sole producer."

The disposal agency pointed out that while it is requested by law to "attempt to interest other chemical concerns in sale or lease of the plant, it is by no means clear whether this would be possible." Quaker Oats controls nearly all the patents relating to production, the report added.

In the case of styrene, the WAA noted that while the Dow Chemical Co. possesses a relatively strong patent position, "it is anticipated that plants can be disposed of to other operators in such a manner as to raise no serious questions under the anti-trust laws."

The disposal agency mentioned no anti-trust possibility in the case of disposal of the carbon black production facilities.

Tire Production Schedules

The 1946 production schedules for passenger car tires will be increased 3,150,000 units to help meet the unprecedented demand, while schedules for other types of tires in more ample supply will be revised downward, the Rubber Division of the Civilian Production Administration reported on May 27 following a meeting with the Rubber Industry Advisory Committee.

The latest plan of tire production calls for the production of 69,150,805 passenger and motorcycle tires in 1946, as compared with 66,000,000 proposed earlier in the year; 13,860,609 truck and bus tires, against 13,760,000; and 4,267,811 tractor-implement tires, against 3,803,000.

To attain this increased production, W. J. Sears, Director of the CPA Rubber Division, indicated that because of the rubber supply situation the industry will find it necessary to reduce schedules on such items as large truck and bus tires, some types of tractor tires, as well as tires for farm implements and

special purposes. However, the available supply of these types of tires was sufficient, he said, to meet the current demand.

In estimating the available rubber supply industry men and CPA officials agreed that supplies would not exceed the 903,000 ton estimate made around the first of the year. This amount of rubber included 190,000 tons of natural rubber, 610,000 tons of GR-S (general purpose synthetic) and 100,000 tons of special purpose synthetics (butyl, neoprene and N-type rubbers).

The political and economic developments in the Far East since V-J Day make it impossible at this time to count on more than 250,000 tons of natural rubber in 1946 (of which 190,000 tons will be available for consumption and the rest will be stockpiled by the government). The processors using petroleum for making synthetic GR-S must operate at full capacity to attain the 610,000 ton estimate, even with the allocation of a small amount of alcohol in the second calendar quarter of this year.

Output of truck and bus tires might drop to 6,000,000 units in the last half of the year compared with an indicated production of 7,860,000 tires in the first half. This will be sufficient to take care of demand, Mr. Sears said.

Shortages Under Discussion

During the course of the meeting, the rubber manufacturing industry was commended by CPA officials for "an outstanding reconversion job." Reconversion in the industry, it was pointed out, has been so rapid that it has outstripped the ability to obtain component materials in full quantities.

Textiles continue in short supply, in addition to such items as resins, casein, and certain compounding materials, such as plasticizers, activators, etc. Bead wire, too, is exceptionally short. (EDITOR'S NOTE: Most rubber manufacturers continue to operate on a hand-to-mouth basis. However, due to material shortages the Zapon-Keratol coated fabrics plant of the Atlas Powder Co. at Stamford, Conn., was forced to close for a short period recently, while shortages of cotton and copper forced a similar shutdown at the Hamden, Conn., plant of the Whitney Blake Co.)

In addition, with the current and prospective shortage of food and feed throughout the world, CPA said there is no strong argument for the allocations of grain and molasses to make more alcohol to supply additional raw materials for the manufacture of synthetic rubber. Based on these factors, it was said, the rubber manufacturing industry is faced with the problem of holding its production sights at approximately the same level as set at the beginning of the year.

Natural Rubber Situation

Imports of natural rubber to the United States have been reported holding up to expectations since the first of the year. So far in 1946, United States rubber imports are estimated at 120,000 long tons as compared with the expected arrival of from 250,000 to 350,000 tons for all of 1946. Total tonnage in stock has not been disclosed, but industry sources estimate that federally controlled warehouses hold 160,000 to 175,000 tons.

Reports from British Malaya indicate that native tappers are up to 75 per cent of their prewar capacity. But the European-operated plantations which produce the bulk of the rubber are slower in resuming operations, largely because of their labor problem.

In the meantime, negotiations among United States, British, French and Netherlands representatives on the future of natural rubber prices are drawing to a climax this month, as the United States rubber purchase contracts with Governments controlling producing areas of the Far East expire on June 30. It is expected that the future price of natural rubber will be higher than the present 20¼c a pound.

Campaign for Higher Prices

An energetic campaign for higher prices is being conducted by Malayan producers. They claim that no account has been taken of their increased costs and expenses of repairing damage caused during the Japanese occupation. They are also demanding a free market for rubber in order to take advantage of the present booming demand. French and Dutch producers are said to be supporting the demand for higher prices in any future contract with the United States.

Reports from Ceylon seem to indicate a growing uneasiness as to the future of the rubber market. During the war, Ceylon was the mainstay of Allied rubber production. Shipments rose from 60,000 tons in 1939 to 111,000 tons within three years, and the price rose to approximately 30c a pound. Today, Ceylonese are worried about synthetic rubber production in the United States, fearing that eventually it may seriously limit the demand for natural rubber. The producers in Ceylon are hoping for some kind of commitment from Great Britain and perhaps the United States that will assure a market for Ceylonese rubber for the next few years until the picture becomes clearer.

An interesting story has come from Brazil about the disappearance of the men who were transported during the war in thousands to the upper reaches of the Amazon to extract rubber for the Allies. All that the Brazilian Government has been able or willing to disclose about the fate of this army of the Amazon is an announcement from the Labor Ministry that more than 50,000 men were recruited for the rubber army and that fewer than 3,000 have so far returned to their homes.

The situation, which has become a burning political question in Brazil, could very well have repercussions on relations with the United States, which sponsored and financed the campaign. One Brazilian representative in the Constituent Assembly declared recently that the men who did not lose their lives in the jungle are having to beg their way home.

Senate Approves Guayule Bill

Authorization of $350,000 for continued research on guayule and other forms of natural rubber that can be raised in this country has been approved by the Senate. Liquidated by the House, the rubber research grant was restored by the Senate as part of the 1947 Agricultural Appropriation Bill. At this writing (June 6), the bill was awaiting final approval by both houses.

The research program has been advocated both by Government and industrial rubber experts as a security measure necessitated by the need for a domestic supply of natural rubber in the event of another national emergency. Appearing recently before the Senate Agricultural Appropriations Committee, William L. Batt, chairman of the Inter-Agency Rubber Policy Committee, declared that for the Government to spend $350,000 for research on natural rubbers grown in this country would be "very modest." He urged this research as a security measure, pointing out that synthetic rubber is not yet satisfactory for all purposes.

Mr. Batt disclosed that last September, R. S. Wilson, vice-president of the Goodyear Tire & Rubber Co., who then was acting as Rubber Director for the Government, advocated liquidation of the wartime emergency guayule program but urged continued research as a security measure.

New Price Regulations

Included among changes in price regulations announced by the Office of Price Administration in recent weeks were the following:

Tires and Tubes: An over-all increase of 4½% is allowed in manufacturers' ceiling prices for original equipment tires by the terms of Amendment No. 6 to R.M.P.R. 119 (Original Equipment Tires and Tubes). Effective June 11, the increases average 7% on passenger car tires and 3.7% on small size truck tires. The increase means an added return to tire manufacturers of approximately $20,000,000 a year, based on forecast volume for the next year.

Scrap Rubber: Ceiling prices for scrap solid tires from tanks are provided in Amendment No. 15 to R.P.S. 87 (Scrap Rubber), issued May 17 and effective May 22. The ceilings range from $25.50 to $36.00 a ton, depending on consuming centers. They are similar to those previously established for scrap solid motor tires.

Reclaimed Rubber: Manufacturers' ceiling prices for reclaimed rubber have been increased by one half cent a pound to take care of recent increases in wages

and material costs. Ceilings were similarly raised for the service of processing scrap rubber into reclaim. These increases were covered in Amendment No. 7 to R.P.S. 56 (Reclaimed Rubber) and Amendment No. 2 to Supplementary Service Regulation 35 to R.M.P.R. 165 (Services), both effective May 31.

Coated Fabrics: Manufacturers' ceilings for fabrics coated with rubber, pyroxylin or oil, except coated window shade cloth, have been increased approximately 13½%. The increase, granted to take care of higher labor and material costs incurred since October, 1945, date of the last price adjustment, is covered by Amendment No. 14 to M.P.R. 478 (Coated and Combined Fabrics), issued and effective May 24. Converters of coated and combined fabrics have been granted an increase of approximately 7% by Amendment No. 13 to the same order, while manufacturers of oil and pyroxylin coated window shade cloth have been granted an approximate 15% increase by Amendment No. 15.

Rubber Footwear: Retail mail order ceiling prices for waterproof rubber footwear were increased approximately 9% by Amendment No. 7 to R.M.P.R. 229 (Retail and Wholesale Prices for Rubber Footwear), issued and effective May 22. This increase enables mail order houses to pass on to consumers the dollar-and-cent increase in their purchase costs resulting from a recent 10% increase in manufacturers' and wholesalers' ceilings on rubber footwear.

Heels and Soles: Manufacturers' and wholesalers' ceiling prices for sales of rubber heels and soles in the shoe factory and home replacement trades have been increased 10½%. The increase, covered by Amendment No. 18 to M.P.R. 477, was effective June 4. The action will result in increased costs to shoe factories of less than one cent a pair on heels and less than three cents a pair on soles. Exemptions from price control of new, reconditioned and used rubber heels and soles declared surplus by the armed forces and offered for sale in regular civilian channels, was announced by OPA on May 30.

Miscellaneous: Exemption or suspension from price control of a number of articles was announced by OPA on May 27. These included cloth-backed pressure-sensitive tape; friction tape and splicing compound; truck tire flaps sold for replacement purposes; and vulcanized vegetable oils, molded and unmolded, excluding truss pads.

S.A.E. Hears Talk by Swart

G. H. Swart, director of research of the General Tire & Rubber Co., Akron, delivered a talk on "Classifications on Rubber and Rubber Compounds" at the summer meeting of the Society of Automotive Engineers, held at the French Lick Springs Hotel, French Lick, Ind., from June 2 to 7. In the first part of his talk, Mr. Swart described the problem of establishing adequate relationships between the physical properties of rubber and rubber-like materials and their chemical composition and ultimate physical structure. He then outlined the work of two committees that are working toward a solution of the problem, one being A.S.T.M. Committee D-11 on Rubber Products and the other Technical Committee A on Automotive Rubber, sponsored by S.A.E. and A.S.T.M.

Form Chemical Warfare Group

Chemical Warfare Association is the name of a new organization formed recently for all officers, enlisted men and civilians who served with the Chemical Warfare Service in either World War I or II. Headquarters of the Association are located at 2153 Florida Ave., N.W., Washington 8, D. C. Included among the officers are Ludlow King, president; Arthur Crosley, first vice-president, and Joseph Schwimer, secretary-treasurer. The first annual meeting of the Association was held on May 24 and May 25 at Edgewood Arsenal, Md.

Report on Acetylene Reactions

A new series of acetylene reactions, worked out by German chemists before and during the war, are described in a report released recently by the Department of Commerce. The report was prepared by investigators for the Technical Industrial Intelligence Branch of the Department of Commerce, who studied German operations at the Ludwigshafen plant of I. G. Farbenindustrie. While the report deals primarily with the synthesis of butadiene by the Reppe process, the investigators believe the information will be of interest to American producers of other organic material. Copies of the report may be secured from the Office of the Publication Board, Department of Commerce, Washington 25, D. C., for $2.00 in photostat form, or 50c in microfilm form.

Plastics Home Institute

Bland Charnas, fabricator of vinylite plastics, has established the Plastics Home Institute, a consumer-testing organization at 24 Ashburton Ave., Yonkers, N. Y., which is to be devoted exclusively to the testing of plastic products made for the home. Whenever the merits of a plastic product made for the home is to be adjudged, the Institute will select a cross-section of consumers to administer the tests in their own homes under everyday conditions. Results of the tests will be compiled and certified by the Institute and announced publicly.

Cadwell Named Research Head

Dr. S. M. Cadwell

Dr. Sidney M. Cadwell, formerly assistant general manager of the tire division of the U. S. Rubber Co., has been appointed director of research and technical development by the company. A native of Boseman, Mont., Dr. Cadwell attended the University of Chicago where he received his B.S. degree in 1914 and Ph.D. in 1917. During World War I, he served as captain in the Chemical Warfare Service. In 1919, Dr. Cadwell joined U. S. Rubber as a research chemist in its general laboratories. After 11 years of rubber and chemical research, he became director of tire development for the company in 1911 with headquarters at Detroit, Mich. In 1945, he was appointed assistant general manager of the company's tire division. In his new position, he will make his headquarters in New York. Dr. Willis A. Gibbons, who has been serving as director of research and technical development for U. S. Rubber, becomes associate director, and will devote his entire time to scientific research.

Hydrogen Generating Methods

New methods for generating hydrogen from a sodium borohydride compound and water have been developed by the United States Army Signal Corps for filling meteorological balloons. It was found in laboratory tests that sodium borohydride is readily hydrolized at a moderate rate by the addition of an acid forming compound, such as boric acid, or by certain catalysts, such as cobaltous chloride. The heat of the reaction per cubic foot of hydrogen was much less than when sodium or calcium hydrides were added. Use of the compound, however, has necessitated radical changes in the design of hydrogen generators. It was found that collapsible rubber bag type generators will deliver the desired amount of hydrogen without waste, dilution of air, or excessive content of water vapor.

TIRE FAILURE ACCIDENTS FOR 1941-44 PERIOD ANALYZED IN ICC REPORT

Each year the Interstate Commerce Commission summarizes the causes of all vehicle accidents involving either passenger or property-carrying common carrier vehicles which come under its jurisdiction. In its latest report, the Commission summarized its information concerning accidents caused by tire failures in the 1941-44 period. The report follows:

In the 1941-44 period the frequency of occurrence for tire failure accidents ranked second to brakes. During this period, the frequency of occurrence increased for each year. In 1941 tire failure accidents accounted for 9.4% of all mechanical defect accidents; in 1942, 12.5%; in 1943, 15.3%; and in 1944, 16.9%. Numerically, the number of such accidents increased from 137 in 1943 to 184 in 1944. For the four-year period, a total of 478 tire failure accidents were reported.

Some tire failures were directly causative of the accidents in which they were reported. In these cases the tire failed while the vehicle was moving, while in other cases the tire failure was only an indirect cause, due to the fact that the vehicle was parked or standing as the result of the tire failure and that while it was so stopped the accident occurred. Almost always in the latter type of accident some other vehicle ran into the stopped vehicle.

Damage Average Increased

The property damage per accident for moving vehicles increased from $413 per accident in 1941 to $3,585 per accident in 1943. In 1944 the property damage per accident for moving vehicles was slightly over $3,000, or nearly $600 per accident less than it was in 1943. Somewhat over 70% of all the tire failure accidents for the four-year period were due to blowouts, while about 20% were due to punctures. In about 8% of the tire failure accidents the type of failure was not reported. More tire failures occurred on the front axle of the power unit than occurred on any other axle. For the four-year period, about 55% of the tire failure accidents reported showed that the failure was on the front axle of the power unit. About 20% of the accidents occurred due, directly or indirectly, to the failure of the tire on the rear axle of the power unit, and somewhat over 20% occurred due to failure of a tire on the trailer axle.

The manufacture of synthetic rubber tires of the larger sizes, such as are generally used by Interstate Commerce Commission carriers, did not start until April, 1944. The total number of tire failure accidents due to failure of synthetic tires for the year 1944 was only 35. Of these 35 accidents, there were 25 synthetic tire failures due to blowouts in which the mileage was reported. The average mileage of synthetic tires before blowing out and causing an accident was 16,285. Five of these synthetic tires had been recapped, the mileage after recapping being 180, 300, 4,000, 5,000 and 12,000 miles, respectively.

The best reported mileage obtained from synthetic rubber tires in which their failure was an element was 94,000 miles. It was reported that these tires ran 82,000 miles and then were recapped. The recap ran 12,000 additional miles before the tire finally blew out. The lowest mileage obtained from synthetic tires in which tire failure was a factor was 125 miles. Only seven tubes made of synthetic rubber were reported, and all but two of these seven tubes were used in combination with synthetic rubber tires.

Average Blow-Out Mileage

Questionnaires sent to the carriers who had reported tire failure accidents did not incorporate the feature of reporting tire mileage until about the time production started on synthetic tires. The mileage of 80 natural rubber tires that failed due to blowouts was reported to the Commission during 1944. The average mileage before blowing out was 30,988. Seventeen of these 80 tires had been recapped, the mileage after recapping varying from 100 miles to 59,932, an average of 11,230 miles.

The highest reported mileage for natural rubber tires was 184,372. This mileage was broken down into 124,440 miles before recapping and 54,932 miles after recapping. No direct information is available from the carrier to account for this unusually high tire mileage; however, the Section of Safety investigated other accidents reported by this carrier and it was found that he was operating on level roads on trips amounting to 100 to 200 miles. In three out of four accidents reported, he showed a payload on a tractor-semi-trailer of only 8 tons, and on the other accident report, the payload amounted to 10 tons. It appeared from examination of these reports that the carrier was operating with relatively light loads, considering the tire sizes and payloads carried. The lowest tire mileage for natural rubber tires before blowing out was 1,100 miles.

Injuries-Per-Accident Data

The injuries per accident and the property damage per accident increased every year from 1941 through 1943, but for 1944 the injuries per accident and the property damage per accident were somewhat less than they were for the year 1943. For 1944, as well as for the four-year period, there were more persons injured in tire failure accidents than there were in brake accidents, although the total number of brake accidents was much greater.

The increase in tire accidents was more or less expected, due to the tire situation brought on by war conditions together with the fact that carriers are normally loading tires heavier than they were during the years before the war started and tires are being run longer and are being recapped more often. These conditions invite more frequent tire failures.

Handles New England Sales

Tom Edwards

who was recently appointed technical sales representative of Stanco Distributors, Inc., and who handles sales in the New England territory, operating out of 378 Stuart St., Boston 17, Mass.

Armour Reports on Research

According to the Ninth Annual Report submitted by the director to the board of trustees of the Armour Research Foundation of the Illinois Institute of Technology, 141 major research projects were in operation during the year of 1945, including 58 new investigations. One of the latter, a project sponsored by the Wyandotte Chemical Corp., was undertaken to study the dispersion of calcium carbonate in carbonate-reinforced rubber. This investigation has involved particle size and dispersion studies of the original pigments and pigment dispersions in rubber by means of the optical and electron microscopes. The information will be used to develop carbonate-reinforced rubber with improved physical properties.

MIT Starts Plastics Research

Long-range research to provide guidance for wiser applications of plastics in consumer products has been started at the Massachusetts Institute of Technology. The work at M. I. T. will be under the supervision of Professor A. G. H. Dietz, of the Department of Building Engineering and Construction. Research will deal with the fundamental engineering properties of plastics and, if necessary, will set up new test methods, similar to those available for other structural materials. None of the research will be aimed at the development of new plastics. Only plastics now in existence or which will become commercially available will be studied, and results of such research will be published.

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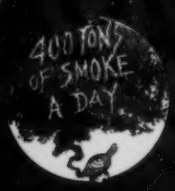

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ASME SCHEDULES TWO SESSIONS OF RUBBER AND PLASTICS GROUP

Two sessions sponsored by the Rubber and Plastics Division of the American Society of Mechanical Engineers will be held during the semi-annual meeting of the Society in Detroit, Mich., from June 17 through June 20. Although headquarters for the meeting are in the Hotel Statler, the two sessions will be held in the Washington Room of the Book-Cadillac Hotel. All engineers interested, whether A.S.M.E. members or not, are invited to attend.

Two papers will be featured at the first session, on the afternoon of June 19, one on "Rubber Springs, Shear Loading—Part II" by J. F. Downie Smith (United Shoe Machinery), and the other on "Evaluation of Rubber and Rubber-Like Materials" by J. D. Morron (U. S. Rubber).

The papers which will be presented at the second session on the morning of June 20, include "Plastics Mold Release" by Earl Ziegler (Dow Chemical); "Flexible Organic Adhesives as Structural Elements" by D. L. Loughborough (Goodrich) and F. D. Snyder (Goodrich), and "Engineering Properties of Fabric Base Thermosetting Laminates" by R. K. Witt (Johns Hopkins University).

Approve Recapitalization Plan

Stockholders of the General Cable Corp. have approved a recapitalization plan that would eliminate dividend arrears of $52.50 a share on the preferred stock and $4 a share on the Class "A" stock. The plan calls for replacement of 150,000 shares of present 7 per cent cumulative preferred stock with 150,000 each of $100 par 4 per cent cumulative first preferred stock and $50 par 4 per cent cumulative convertible second preferred stock. Holders of old preferred stock have the right to exchange their stock at the rate of one old for one each of the new preferred, plus $12.50 cash and accrued dividends from May 1. The 306,689 Class "A" shares will be reclassified into common stock on the basis of four common for each "A" held. The company has 671,858 common shares outstanding out of an authorized 3,000,000.

Veterans Reintegration Programs

The Rubber Manufacturers Association, 444 Madison Ave., New York 22, N. Y., recently completed a survey of current information having to do with the readjustment of veterans to civilian life. The results of the study have been compiled and briefed in a special report which the Association is offering to the rubber manufacturing industry under the title of "Veterans." The report serves as a checklist of current booklets, films and articles covering various phases of the readjustment of the veteran to civilian activity.

LIST OF SECRETARIES OF VARIOUS LOCAL RUBBER GROUPS

For the convenience of our readers who have occasion to contact secretaries of various local rubber groups on miscellaneous matters from time to time we have compiled the following list of current secretaries. We suggest the list be clipped and saved for future use.

Local Group	*Secretary*
Akron Rubber Group	Henry F. Palmer, Firestone Tire & Rubber Co., Akron, Ohio.
Boston Rubber Group	Richard K. Patrick, Windram Manufacturing Co., 3 Dorchester St., Boston 27, Mass.
Buffalo Rubber Group	E. R. Briggs, Hewitt Rubber Corp., 240 Kensington Ave., Buffalo 5, N. Y.
Chicago Rubber Group	Robert C. Dale, Inland Rubber Corp., 27th and Wentworth Ave., Chicago 16, Ill.
Connecticut Rubber Group	Alfred J. Jennings, Fabrics Division, E. I. du Pont de Nemours & Co., Fairfield, Conn.
Detroit Rubber & Plastic Group	E. J. Kvet, Baldwin Rubber Co., 366 E. S. Boulevard, Pontiac, Mich.
Los Angeles Rubber Group	C. H. Churchill, B. E. Dougherty Co., 1807 East Olympic Boulevard, Los Angeles 21, Calif.
New York Rubber Group	Peter P. Pinto, RUBBER AGE, 250 W. 57th St., New York 19, N. Y.
Northern California Rubber Group	Bill Blackburn, Shell Development Co., Emeryville 8, Calif.
Ontario Rubber Section, Chemical Institute of Canada	A. B. Lockley, Goodyear Tire & Rubber Co. of Canada, Ltd., Lake Shore Road, New Toronto, Ontario, Canada.
Philadelphia Rubber Group	T. T. MacConnell, U. S. Rubber Reclaiming Co., Inc., 500 Fifth Ave., New York 18, N. Y.
Quebec Rubber & Plastic Group	Norman Burnett, Dominion Rubber Co., 550 Papineau Ave., Montreal, Quebec, Canada.
Rhode Island Rubber Club	H. W. Greenup, Tigron Latex Corp., Shaw St., Fall River, Mass.

Polymer Forum Being Planned

Based on the success of the high polymer forum held at the recent meeting of the American Chemical Society held in Atlantic City, plans are being made to hold a similar forum at the next meeting of the Society in Chicago. A.C.S. divisions sponsoring the forum are Cellulose Chemistry; Colloid Chemistry; Organic Chemistry; Paint, Varnish, and Plastics Chemistry; Physical and Inorganic Chemistry; and Rubber Chemistry. Preliminary plans call for the organization of a program covering two days. Those desiring to submit papers are requested to furnish the title and a thousand-word abstract to the secretary of his own division, with a copy to H. Mark, Polytechnic Institute of Brooklyn, Brooklyn 2, N. Y., before July 5.

Forms Polymer Chemical Co.

The Polymer Chemical Co., 5920 Carthage Ave., Cincinnati 12, Ohio, has been formed by H. N. Waldman for the manufacture of rubber solvent cements and latex adhesives and coatings. The new company will also manufacture reclaim and synthetic resin cements. Specialty polymers and industrial chemicals will also be produced.

Mimex Moves Facilities

Mimex Co., manufacturer of can closures and latex and rubber cements, has moved its offices, laboratory and plant to 37th St. and 12th Ave., Brooklyn 18, N. Y. Julius H. Haines is president of the company.

MELLON INSTITUTE REPORTS ON RESEARCHES OF 1945-46

A review of the research activities conducted at Mellon Institute for the fiscal year ended February 28, 1946, recently made available, discloses some of the discoveries made for the synthetic rubber industry. An abstract on these discoveries from the report follows:

The multiple fellowship on catalysis, set agoing in midyear of 1944 by the Rubber Reserve Co. (later converted to the Office of Rubber Reserve of RFC), had a comprehensive program and an expanded staff of more than sixty investigators during 1945. The purpose of the investigations was to accomplish improvements in the manufacture of butadiene from ethyl alcohol, the principal efforts being concentrated on better catalysts. The importance of this work is apparent upon realization that the major part of the initial burden of production of butadiene sufficient to meet emergency requirements was borne by the alcohol process.

As the program progressed in its complex ramifications it became a well coordinated research assembly line in which specialists and their aides contributed a definite series of basic findings here and observations through close cooperative contact there, with skillful direction toward a planned end. Close collaboration with plant operating personnel was maintained throughout to expedite transmutation of laboratory results to plant practices.

Owing to the termination of hostilities the alcohol plant operations were ended late in 1945 and consequently not all the research contributions were carried to industrial utilization. The fellowship developed methods of catalyst preparation and evaluation amenable to a program for testing 500 catalysts per year to determine efficiencies in the synthesis of butadiene from alcohol. Analytical procedures for the product and by-product constituents evolved for these laboratory catalyst evaluations employed chemical and physical methods, readily adaptable for facilitating and maintaining efficient commercial plant operations. New catalysts were made and tested in the pilot plant stage but did not reach industrial application.

Other advances outside the field of catalysis include discoveries that butadiene yields from alcohol are appreciably increased by recycling of certain previously discarded by-products and by modifying the operating procedures. Because of the loss of government interest in the alcohol process for the manufacture of butadiene, the investigations in catalysis have ceased and the fellowship has been assigned critical problems in the commercial production of synthetic rubber.

The Firestone Champion is the name of a new dealer magazine distributed to its retail outlets by Firestone. To be published on a quarterly basis, the new magazine boasts a 50,000 circulation.

Coming Events

June 20. Quebec Rubber & Plastics Group, Golf Tournament, Summerlea Golf Club, Montreal, Canada.

June 21. New York Rubber Group, Outing, Blasberg's Grove, Hawthorne, N. J.

June 21. Akron Rubber Group, Outing, Seiberling Country Club, Akron.

June 21. Rhode Island Rubber Club, Outing, Wannamoisett Country Club, East Providence, R. I.

June 24-28. A.S.T.M., 49th Annual Meeting, Buffalo, N. Y.

June 25. Rubber Division, Chemical Institute of Canada, Royal York Hotel, Toronto, Canada.

June 28. Boston Rubber Group, Outing, Woodland Golf Club, Newton, Mass.

Sept. 11-13. Rubber Division, A.C.S., Fall Meeting, Hotel Sherman, Chicago, Ill.

Sept. 20. Philadelphia Rubber Group, Outing. (Site to be selected.)

Sept. 21. Connecticut Rubber Group, Outing. (Tentative.)

Oct. 7-12. 34th National Safety Congress, Chicago, Ill.

St. Joseph Promotes Outcault

Harry E. Outcault, formerly technical service manager of the zinc oxide department of the St. Joseph Lead Co., 250 Park Ave., New York 17, N. Y., has been appointed assistant sales manager of that department. Widely known in the rubber industry, Mr. Outcault has been associated with St. Joseph Lead since 1931. He was graduated from Ohio State University with a degree of bachelor in chemical engineering in 1917. During World War I he served as a lieutenant in the Chemical Warfare Service, being stationed at the Bureau of Standards and at the American University Experiment Station, both in Washington, D. C. In 1922 he joined the New Jersey Zinc Co., where he served as rubber technologist at the Palmerton, Penna., plant for five years, and as head of the technical service to the rubber industry for four years. Mr. Outcault was the 1945 chairman of the New York Rubber Group.

Stock Issue Approved

Stockholders of the Rome Cable Corp. have approved the issuance of 63,275 of authorized 75,000 new convertible preferred shares, and an increase in the number of common shares from 200,000 to 600,000. Each common stockholder will receive the right to subscribe to one share of the $30-par preferred stock for each three shares of common held.

GOODYEAR OFFICIAL FORECASTS 100,000-MILE SYNTHETIC TIRE

Dr. R. P. Dinsmore, vice-president of the Goodyear Tire & Rubber Co., forecast that synthetic rubber will be responsible for the future development of a 100,000-mile automobile tire, in a recent address in Detroit at a dinner marking the eve of the automobile industry's Golden Jubilee celebration. The outstanding improvements in future tire development may not come from natural rubber, he said, and while synthetic rubber is not yet completely its equal it would be a reversal of our whole experience if it did not ultimately become superior.

In addition to improved synthetic rubber, Dr. Dinsmore predicted that superior synthetic fibers and cords will be developed, and improved carbon blacks or other reinforcing materials will be brought along also. By such improvements, he declared, we can reduce the heat developed in a tire which must be sturdy enough to wear for the long mileages which we can expect in the future.

A 100,000-mile tire, he pointed out, would last as long as the average owner keeps his car. The 30,000 to 50,000-mile tire expected today, depending upon operating conditions, has been perfected chiefly through improved synthetic reinforcing compounds and fabrics and "it is now significant that the remaining major material, namely, the rubber, has been made by synthetic processes."

Dr. Dinsmore reviewed the history of tire manufacturing through the 50 years of the automobile, from the earliest pneumatic tire through 38 years of rubber research to World War II and conversion to synthetic material. He recalled that the first pneumatic tire had unstable clincher beads, poor rubber compounds and a stiff canvas carcass subject to bruises and frequent punctures, but said that subsequent tire development paralleled the sweeping increases in automotive power and changes in car design and driving conditions.

Among Goodyear's contributions to the tire industry, Dr. Dinsmore mentioned the development of the woven tape wire bead and detachable rim in 1905, the straightside tire which did much to reduce tire failures from rim cutting, the first pneumatic truck tire in 1916, the introduction of the balloon tire and the airwheel, the development of the tractor tire, and research leading to improved cords and fabrics.

A new slide-rule type Decalcomania Selector to assist manufacturers and product designers in the specification of the correct decalcomania nameplate, trade mark, instruction or wiring diagram for application on difficult and unusual surfaces has been developed by the Meyercord Co., 5323 W. Lake St., Chicago 44, Ill.

COMMERCE DEPARTMENT ISSUES REPORT ON GERMAN PLASTICS

Information on 19 major developments in the field of plastics in Germany, believed to be particularly adaptable by American industry, has been released by the U. S. Department of Commerce. Among the 19 items are two new, tough, high-melting synthetic fibers (based on caprolactam and isocyanates), new magnetic fillers for plastics, cellulose water soluble detergent ether-acids which should reduce fat usage in soaps, rot resistant fiber from chlorinated polyvinyl chloride, and non-oil protective coats.

Data on these and other developments in the German plastics industry are presented in *German Plastics Practice*, a comprehensive, illustrated report, prepared by J. M. DeBell, W. C. Goggin, and W. E. Gloor for the Quartermaster General. The information contained in the work represents the findings of the authors during their four-month investigation of the German plastics industry. Under Mr. DeBell, the investigators visited about 40 leading chemicals and plastics factories, including some I. G. Farbenindustrie plants, in the American, British, French and Russian zones of occupation.

Chemicals used by the Germans in making plastics, types of plastics produced, methods of production, practical applications, and German research in plastics are described in detail in the report.

New Lines of Development

The German plastics industry, cut off from many of its normal sources of raw materials during the war, followed new lines of development, particularly in the use of derivatives of acetylene, heavy chemicals, and coal. Another important factor in German plastics development was the predominance of the research divisions of the I. G. Farbenindustrie. This resulted in emphasis on chemical rather than mechanical phases of the plastics industry.

German fabrication and molding operations, though they involved ingenious devices, are essentially small scale as compared to American standards, according to the investigators. However, German chemical practice in the newer unsaturate polymers reportedly was efficient and attained surprising volume.

Samples of German plastics brought back by the investigators have been deposited with the National Bureau of Standards in Washington. Manufacturers or research organizations interested in inspecting or obtaining specimens for testing may communicate with Dr. Gordon M. Kline of the Bureau. The results of such tests will become the property of the United States Government.

The report is available in photostat form for $25 and microfilm form for $4, and may be ordered from the Office of the Publication Board, Department of Commerce, Washington 25, D. C. Orders should be accompanied by check or money order, payable to the Treasurer of the United States. The report is also being published privately in book form by DeBell and Richardson, P.O. Box 240, Springfield, Mass. The book will contain about 400 pages, including approximately 300 illustrations and an index, and can be obtained for $4.50.

Hold First Foundation Lecture

A Healey, director of production of the Dunlop Rubber Co., Ltd., was the principal speaker at the first Foundation Lecture of the Council of the Institution of the Rubber Industry held in the Grand Hotel in Birmingham, England, on May 10. In his talk, Mr. Healey referred to the past achievements of the rubber industry, using them as an aid in predicting future trends. He said that a surplus of rubber during the pre-war years, and scarcity during the war, both had a relatively small effect on the industry, which he felt would expand steadily in the future. Empirical applications have now ended and the industry should receive an impetus from modern molecular physics and chemistry, the speaker stated. He further predicted that sponge rubber upholstery is likely to become important in the near future. The Council plans to establish the Foundation Lecture as an annual affair.

Pigment Colors for Vinyl Film

Two new lines of pigment colors, one for machine printing and the other for screen printing, have been introduced by Aridye Corp., a subsidiary of Interchemical Corp., Fair Lawn, N. J., for printing on vinyl film and vinyl coated fabrics. As received by the user, these colors consist of a high concentration of pigments dispersed in an organic solvent. They are reduced to the concentrate required for printing by hand, stirring them into a clear reducer. Two types of clear reducers are available, one for machine printing and the other for screen printing. After printing, the vinyl film is either air dried or passed through a suitable dryer at a temperature of about 160° F.

Order Additional Hopper Cars

Twenty additional hopper cars have been ordered by the Continental Carbon Co. and the Panhandle Carbon Co. to expedite shipments of their dustless, pelleted carbon blacks for which the Witco Chemical Co. is sole selling agent. The cars have been ordered from the General American Transportation Co. and delivery is expected later in the year. They will permit more efficient handling and prompter shipments of blacks by the manufacturers.

GOODRICH CHEMICAL COMPANY HOLDS THREE-DAY SALES CONFERENCE

Members of the B. F. Goodrich Chemical Company Hycar synthetic rubber and rubber chemicals division recently concluded a three day sales conference with an inspection of the company's development and sales service laboratory in Cleveland, Ohio. W. D. Parrish (extreme right), technical service manager for Hycar, demonstrates the relative merits of this versatile product to (first row, left to right) J. R. Hoover, vice-president in charge of sales; J. H. Rines, staff representative, synthetic rubber and rubber chemicals; Howard E. Anderson, Chicago and central states sales representative for Hycar, rubber chemicals and Philadelphia reclaimed rubber; Ray E. Bitter, west coast representative for all products of the company; (second row, left to right) Dorn E. Sauser, sales service laboratory; Dr. B. S. Garvey, sales development; Roger C. Bascom, northeastern representative for Hycar and rubber chemicals; (third row, left to right) Frank E. Bell, middle western states sales representative for Hycar and rubber chemicals and eastern representative for Philadelphia reclaimed rubber; J. C. Richards, sales manager, Hycar and rubber chemicals; and Allyn I. Brandt, general sales manager.

TALKS BY DALES AND CLAYTON HEARD BY PHILADELPHIA GROUP

Approximately 90 members and guests attended the meeting of the Philadelphia Rubber Group, held at Kugler's Restaurant in Philadelphia, Penna., on June 7. The program featured two interesting talks, one on "Neoprene Latex in Industry," by Dr. Benton Dales, head of the latex section of the rubber laboratory of E. I. du Pont de Nemours & Co., Wilmington, Del., and the other on "Perbunan Latex Compounding and Properties," by Robert E. Clayton, Esso Laboratories, Standard Oil Development Co., Linden, N. J.

Dr. Dales started his talk by asserting that industry during the war years has shown that anything that can be made from natural latex can be made by similar processes from neoprene latex and that the neoprene product will be a good and useful one. Since it will probably cost more than the natural article, there will be products of so nearly equal properties that cost will determine whether neoprene or natural latex will be used in the future, he said.

According to the speaker, there are two important differences between neoprene and natural latices which affect all neoprene latex processing. Neoprene from latex requires more time and heat for proper vulcanization than rubber from latex and the neoprene dries more slowly than the rubber.

Discussing the compounding of neoprene latex, Dr. Dales said that 3 to 5 per cent of zinc oxide is necessary for vulcanization and with it 2 per cent of phenyl beta naphthylamine or an equally good antioxidant for good aging. The vulcanization rate is accelerated by the use of 2 per cent of Polyac or 1 per cent of it with 1 per cent of dithiocarbamates or of some other rubber accelerators. Resistance to stiffening or freezing of neoprene products is improved more by good cure than any other thing; addition to the compound of 1 per cent sulfur or up to 7.5 per cent of suitable dispersed factices or 10 per cent of GR-S Latex No. 3 is useful in improving this property.

Dr. Dales concluded his talk by listing a number of compounding ingredients which confer desirable properties on neoprene latex products. Among these are hard clay, lithopone, zinc sulfide, aluminum hydroxide and semi-reinforcing blacks. Discoloration of neoprene latex films on exposure to light may be reduced by compounding with 25 parts of zinc oxide or 2 to 3 per cent of Agerite Alba or Santowhite.

In the second talk, Mr. Clayton analyzed Perbunan Latex Type H, a concentrated water dispersion of Perbunan 26, which he said was used extensively where the properties of oil resistance, high temperature aging and abrasion resistance are desired.

Discussing the compounding procedures of Perbunan Latex, he said that stabilization toward the action of compounding ingredients is obtained by the addition of certain amines such as dimethylamine and diethylamine, potassium or sodium hydroxide, detergents including soap or combinations thereof. Perbunan Latex is vulcanized with the same type of curing ingredients as those used for natural latex but the rate of cure for Perbunan is somewhat faster.

The speaker pointed out that the pure gum physical properties of Perbunan, as is the case with all butadiene type emulsion polymers, are rather low. However, considerable reinforcement is obtained by means of fillers, such as various carbon blacks and clays which improve tensile strength and tear resistance. The ability of Perbunan Latex to be thus reinforced was indicated as an important consideration from the standpoint of cost as well as the resulting physical properties. The same softeners customarily used in Perbunan 26 dry rubber compounding may be used with Perbunan Latex.

In dipping processes, the speaker said, softeners have been found to eliminate cracking that otherwise tends to occur as the film dries. The usual thickeners for natural latex, such as the caseinates, alginates, polyacrylates, methyl cellulose and various gums, are also effective for Perbunan Latex.

Industrial Trucks

Rubber manufacturers rank 12th among the nation's private industrial users of electric industrial trucks, according to a survey completed by the Electric Industrial Truck Association, Chicago, Ill. In the rubber industry, 717 trucks were in use in 61 plants as of December 31, 1945, an average of about 11 trucks per plant, the survey shows. It is also revealed that some 5,000 plants of all types, excluding government-owned and operated facilities, were using a total of 34,802 electric trucks as of December 31 to solve their material handling problems, an average of about 6 trucks per plant.

To Serve as Latex Consultant

Benton Dales, whose retirement as head of the latex section of the rubber laboratory of E. I. du Pont de Nemours & Co., becomes effective on July 1, will continue to serve the latex industry as a consultant. Mr. Dales became associated with the rubber industry in 1918 when he joined the research laboratories staff of the B. F. Goodrich Co. in Akron. He joined Premoid Products, Inc., Springfield, Mass., in 1929, to assist in developing their latex impregnated paper products. Since 1935 he has been associated with DuPont in the development of neoprene latex from laboratory sample to its present state. Dr. Dale's address is 25 Truepenny Road, Bowling Green, Media, Penna.

THORNE, LEE AND BURNETT ELECTED BY QUEBEC GROUP

E. A. Thorne, of the Diamond State Fibre Co., and G. A. Lee, of Canadian Industries, Ltd., were elected chairman and vice-chairman, respectively, of the Quebec Rubber and Plastics Group at the meeting of the group held at the Ritz-Carlton Hotel in Montreal, Quebec, on May 13. N. Burnett, of the Dominion Rubber Co., Ltd., was elected secretary-treasurer.

At the same meeting, E. D. Bent, of the Northern Electric Co., was appointed honorary chairman of the executive committee. Other members appointed to the committee include W. R. Blundell (Dominion Rubber), J. D. Benedito (Canadian Resins & Plastics), W. D. Hinkhouse (Bolta Plastics), A. S. McLean (British Rubber of Canada), F. G. Rice (Canadian Industries), J. H. McCready (Hale Brothers), H. J. Loiselle (Northern Electric) and F. B. Grant (Dewey & Almy Chemical of Canada).

The business portion of the meeting, which preceded a smoker, was routine in nature. In addition to the secretary-treasurer's report, short reports were also received and approved on behalf of the membership, publicity and reception committees. Membership in the group at the start of the current year was reported to be 113, as compared with 109 at the start of the previous year.

Detroit Hears Wanamaker

Approximately 100 members and guests heard C. L. Wanamaker, production manager of the tire division of the U. S. Rubber Co., deliver a talk on "Wartime Challenge to Management" at a meeting of the Detroit Rubber and Plastics Group held at the Detroit-Leland Hotel in Detroit, Mich, on May 17. In his talk, Mr. Wanamaker discussed the experiences of the U. S. Rubber Co. in the manufacture of small arms during the war. He described how the company's facilities and factories were organized for the development, improvement and manufacture of machine guns and light caliber guns. Another feature of the evening was the showing of a movie, entitled "Flotation Studies of Army Vehicles in Muddy Terrain."

Forms Wetherbee Chemical Co.

Burt Wetherbee, who has been representing the General Latex & Chemical Corporation in Western New York, Pennsylvania and Michigan, has organized the Wetherbee Chemical Co. In addition to continuing representing of General Latex in the territory mentioned, the new company will also act as sales agent for the Advance Solvents & Chemical Corp. and the Rubber Department of the American Cyanamid & Chemical Corp. in Western New York Headquarters of the Wetherbee Chemical Co. are at 525 Washington Highway, Snyder 21, N. Y.

JOINT MEETING HEARS TALK ON GERMAN RUBBER INDUSTRY

Major Glen Gay, of the Chemical Warfare Laboratories of the Department of National Defense, Ottawa, Canada, was the principal speaker at a joint meeting of the Buffalo Rubber Group and the Ontario Rubber Section of the Chemical Institute of Canada, held in the General Brock Hotel in Niagara Falls, Ontario, on June 5. Approximately 100 members and guests heard Major Gay, who visited Germany in the fall of 1945, discuss "Investigation on German Rubber Companies."

In his talk, Major Gay revealed that Germany lagged behind the Canadian and American rubber industries in manufacturing methods, rates of production and general technique. From 1935 on, Germany had concentrated on the production of war materials and neglected her basic industry.

There was little interchange of information between the various rubber manufacturing companies, producers of rubber chemicals, users and industry and Government agencies. Little new equipment had been introduced in Germany for several years prior to the outbreak of war and there was little knowledge of the technical advances made in the United States and Canada since 1939.

A. B. Lockley, secretary-treasurer of the Ontario Section, acted as chairman of the meeting in the absence of J. W. Holmes, Jr., and C. H. Black, of the Canada Wire & Cable Co., introduced Major Gay.

Gates Club Hears DuBois

Approximately 140 members and guests attended the May meeting of the Gates Technical Club of the Gates Rubber Co., held in Denver, Colo. Gaston DuBois, vice-president of Monsanto Chemical Co., was the principal speaker of the evening. In his talk, Mr. DuBois reviewed the history of the American chemical industry and pointed out its relationship to the rubber and plastics industries. He felt that in time the rubber and plastics industries would combine to become one industry, and stated that it would be wise for the rubber groups to become acquainted with those materials now referred to as plastics.

Boston Group Schedules Outing

The regular summer outing of the Boston Rubber Group will be held at the Woodland Golf Club on Friday, June 28. A golf tournament will feature the outing, which will also include softball games, horseshoe pitching, dart throwing and a putting contest. Prizes will be awarded in all events. Charles E. Reynolds, of the Cambridge Rubber Co., Cambridge 39, Mass., is secretary-treasurer of the group.

Sets Up Consulting Service

Ralph B. Symons

Ralph B. Symons, who recently resigned as chief chemist of the Carr Manufacturing Corp., has organized a consulting service for the rubber and plastics industries, with headquarters at Main Road, Tiverton, R. I. Mr. Symons will feature development of, and trouble shooting on, compounds and processes, especially on the extrusion of rubber and thermoplastics in general. A graduate of the University of Toronto, Mr. Symons has had many years of practical experience in the rubber manufacturing field, particularly in the insulated wire and mechanical goods fields. His past connections have included contacts with Dunlop, Canada Wire and Firestone. He also served as technical sales representative for the Wilmington Chemical Corporation before joining the Carr organization.

Connecticut Group Visits Plant

The meeting of the Connecticut Rubber Group, held on May 17, consisted of a visit to and inspection of the synthetic rubber plant operated by the U. S. Rubber Co. at Naugatuck, Conn. Approximately 100 members and guests were guided through the plant, in groups of 10 or 12, and every step in the synthetic rubber process was explained. Prior to the inspection trips, those visiting the plant were shown a movie entitled "Winning the Battle of Synthetic Rubber." Those attending the meeting were unanimous in their praise of the treatment accorded at the plant.

"Foneholder," a device which enables the user to rest a telephone on the shoulder, has been placed on the market by Reyam Plastics Products Co., 1525 E. 53rd St., Chicago, Ill. It is easily attached, will not mark clothes, and acts "like an extra hand."

FROST AND CRUMPLER HEAD THE CHICAGO RUBBER GROUP

An election of officers featured the final meeting of the current season of the Chicago Rubber Group, which was held at the Morrison Hotel in Chicago, Ill., on May 24. Francis S. Frost, Jr., of the Frost Rubber Works, was elected chairman, and William N. Crumpler, of the George S. Mepham Corp., vice-chairman. Robert C. Dale, of the Inland Rubber Co., was named secretary-treasurer.

Principal speakers at the meeting included James A. Merrill, assistant manager of research of the Goodyear Tire & Rubber Co., Akron; John M. Ball, eastern representative of the Midwest Rubber Reclaiming Co., East St. Louis, Ill., and Dr. Ernst A. Hauser, of the Massachusetts Institute of Technology, Cambridge, Mass.

Mr. Merrill, the first speaker, presented a paper on adhesives, particularly the application of adhesives to metal. His paper is reprinted elsewhere in this issue. The second speaker, Mr. Ball, delivered a talk on "Reclaimed Rubber During Reconversion." The talk was similar in content to that given by the speaker at a number of other rubber group meetings. Dr. Hauser, the final speaker, described ultra-microscopic studies of natural and synthetic rubbers. He used color slides to illustrate his talk.

Akron Group Elects Officers

Jack R. Moore, of the Standard Chemical Co., and Roy M. Vance, of the General Tire & Rubber Co., were elected chairman and vice-chairman, respectively, of the Akron Rubber Group at the Spring Meeting of the group, held at the Mayflower Hotel in Akron on May 17. There was a tie vote between Henry F. Palmer, of the Firestone Tire & Rubber Co., and Jack H. Fielding, of the Goodyear Tire & Rubber Co., for the office of secretary-treasurer. A re-vote for this office will be conducted during the group's summer outing at the Seiberling Country Club on June 21. Another feature of the meeting, which was attended by approximately 220 members and guests, was an address by Arthur C. Horrocks, of the Goodyear Tire & Rubber Co., on this country's present economic and moral status.

Ontario Elects Officers

At a meeting of the Ontario Rubber Section of the Chemical Institute of Canada at the General Brock Hotel in Niagara Falls, Ontario, on June 5, the following officers were elected: *Chairman*, A. B. Lockley (Goodyear); *Secretary-Treasurer*, J. P. Hooper (H. L. Blachford Co.). G. J. Baxter (Firestone), Eric Bolton (Goodrich) and D. F. Walker (Dunlop) were elected members of the Executive Committee.

New Goodrich Appointments

Five new appointments affecting its Hycar, rubber chemicals and reclaimed rubber divisions, have been announced by the B. F. Goodrich Chemical Co., Cleveland, Ohio. The new appointments include J. C. Richards, Jr., as sales manager for rubber chemicals, in addition to his duties as sales manager for Hycar and reclaimed rubber; W. D. Parrish, technical service manager for rubber chemicals, in addition to his duties as technical service manager for Hycar; and J. H. Rines, staff representative in the Cleveland office for synthetic rubber and rubber chemicals, in addition to his duties as eastern sales representative for reclaimed rubber. C. B. McKeown, formerly technical manager and coordinator for synthetic rubber production, has been appointed technical service staff representative on synthetic rubber and rubber chemicals, while Dr. B. S. Garvey, Jr., formerly technical service manager for rubber chemicals, has been transferred to the company's sales development staff.

Synthetic Plant For Sale

The Government-owned synthetic rubber plant at Louisville, Ky., operated by the B. F. Goodrich Chemical Co., has been offered for sale by the War Assets Corporation. Design of the plant makes possible the production of either 60,000 tons of Buna S or 37,500 tons of Buna S and 12,500 tons of Buna N a year. Situated on a site of 34 acres, the plant consists of 25 steel and concrete structures having a total floor space of 303,000 square feet. An adjacent tank farm contains thirty-three 30,000-gallon pressure tanks, one 22,500 gallon tank, and one 15,000 gallon tank.

Titanium Case Set for Review

The United States Supreme Court agreed on May 20 to review a lower court finding that E. I. du Pont de Nemours & Co., Inc., the National Lead Co. and Titan Co., Inc., had violated the Sherman Anti-Trust Act. The United States District Court in New York City recently held that the firms had combined to restrain foreign and domestic trade in titanium compounds. It further held that the Government was entitled to a decree restoring titanium to "a system of free competition."

Bakelite Buys Ottawa Plant

Purchase of the uncompleted tire plant at Ottawa, Illinois, from the War Assets Corporation has been announced by the Bakelite Corporation. The plant was one of the emergency tire units and was to have been operated by the Inland Rubber Corporation on completion. Bakelite is reported to have paid $600,000 for the property. No announcement has as yet been made concerning the use to which Bakelite will put the plant.

Joins Farrel-Birmingham

Edgar S. Thompson

Edgar S. Thompson, formerly associated with the Armstrong Cork Co., where he worked on new product development, has joined Farrel-Birmingham Co., Inc., Ansonia, Conn., as a member of the company's rubber and plastics machinery sales division. Born in New Hampshire, Mr. Thompson received his B.S. degree in chemistry at the University of New Hampshire and a master's degree in chemical engineering at Harvard University. He joined the General Chemical Co. in 1933, and served successively as production and development engineer. In 1939, he became associated with the Armstrong Cork Co.

A fire-resisting cover made out of Asbestone, a lightweight material which is said to outwear cotton, for the rolls of home electric irons is now being produced in various sizes by U. S. Rubber.

Ideal Industries, Inc., Sycamore, Ill., has acquired all the assets and liabilities of the Ideal Commutator Dresser Co., manufacturers of electrical and mechanical equipment.

Statistical Section

The new Statistical Section planned for this issue of RUBBER AGE has been delayed due to compilation difficulties, but will definitely appear in the next issue. This section will alternate in appearance with the new section devoted to Current Market Prices of Rubber Chemicals and Compounding Ingredients which made its initial appearance in the May, 1946, issue. The latter section will be found in this issue beginning with page 360.

Meritorious Service Awards

Certificates of Meritorious Service were presented to members of the Tire and Tube Repair Materials Industry Advisory Committee by the Office of Price Administration at a dinner on June 5 at the Statler Hotel in Washington, D. C. The Committee, established in January, 1945, has advised OPA on problems arising in connection with the administration of ceiling prices on camelback and repair materials for tires and tubes. Ernest Leach, of the General Tire & Rubber Co., is chairman of the Committee. Other members of the Committee include G. F. Oliver (Oliver Tire), John J. Wolfe (R.M.A.), M. J. Way (Miller Rubber), T. J. Bagley (Hollingshead), Albert Buxbaum (Buxbaum Co.), B. C. Eberhard (Goodyear), J. W. Hodgson (Firestone), Harry L. Kincade (U. S. Rubber) and H. J. Cope (Cascade Rubber).

Pepton 22—New Plasticizer

A new plasticizer, known as Pepton 22, has been introduced by the American Cyanamid & Chemical Corp., 30 Rockefeller Plaza, New York 20, N. Y. Advantages claimed for the new plasticizer are reduced breakdown time, increased production capacity, the production of a softer GR-S or natural rubber in a given milling time, the control of GR-S gel build-up in hot processing, the reduction of heat developing in processing, thereby lowering the processing temperatures, improved processing qualities, and the reduction of rejects. According to the company, the new plasticizer will not produce dermatitis or toxic effects, will not discolor white or light colored stocks, will not bloom, and will not affect aging adversely.

Assigned to California Plant

Four officials of the home plant of the Ohio Rubber Co. at Willoughby, Ohio, have been transferred to the company's partially-completed plant at Long Beach, Calif. R. Dean Thomas, formerly manager of the company's mat division, will head the California branch as plant manager. Assisting him will be Del Schade as chief chemist, L. E. Budnick, assistant treasurer and assistant secretary, and Louis Kotich, general engineer.

Agent Visits United States

Alfred Nash, of Hughes & Hughes, Ltd., agents in Great Britain for Godfrey L. Cabot, Inc., has returned to London after a month's business trip in the United States. During his stay in this country, Mr. Nash discussed the overseas market situation with Cabot officials in Boston, Mass., and flew to Texas for further talks with production heads in Pampa, where many of the Cabot carbon black plants are located.

PASSENGER TIRE PRODUCTION INCREASED 15.81% IN MARCH

Production of passenger car tires by American manufacturers in March rose 15.81% over the previous month, increasing from 4,585,398 units to 5,310,273 units, according to the latest statistical report of the Rubber Manufacturers Association. Production for the first quarter of 1946 was estimated at 14,600,763 units, as compared with 12,607,000 units produced during the first quarter of 1940, the year in which the industry achieved its present peacetime annual record of 50,965,000 passenger car tires. The March, 1946, production was at the rate of 63,000,000 units a year.

Truck and bus tire production increased 13.12% in March, totaling 1,375,571 units, as compared with 1,216,021 units in February. Total production of automotive pneumatic casings in March amounted to 6,685,844 units, an increase of 15.24% over the previous month, while the output of passenger car, truck and bus tubes increased 19.81%, from 4,874,026 units in February to 5,839,622 in March. Production of truck and bus tires in the first quarter of 1946 amounted to 3,859,290 units, as compared with 2,289,000 in the first quarter of 1940 and 5,370,008 in the first quarter of 1945 when military requirements were at record levels.

The Association's report notes that weekly production figures since March have continued to climb, and that the only thing that stands in the way of the industry's goal of 66,000,000 passenger car tires in 1946 is the threat of shortages in component materials. Barring development of such shortages, the industry may well exceed its production program. Vacation periods may also be a limiting factor during the summer months.

With the industry fully converted and its production far above previous levels, the report points out, tire plants are consuming raw materials at an unprecedented rate. When this record demand for tire materials is squared against abnormally short supplies of textiles, casein, resin and other components, the reality of these shortages as a threat to uninterrupted production is apparent.

In line with increased production, March shipments of passenger car tires amounted to 5,301,631 units, an increase of 22.35% over the previous month, while inventories at the end of March declined 4.5% to 2,383,421 units. Truck and bus tire shipments increased 16.25%, from 1,134,980 units in February to 1,319,358 units in March, and inventories increased 1.8% to 1,008,780 units at the end of March. Shipments of passenger car, truck and bus tubes totaled 5,648,856 units in March, an increase of 28.79% over the previous month, while inventories at the end of March amounted to 4,518,903 units, an increase of 2.29% over the end of February.

The Association's report covers only automotive pneumatic casings and tubes.

Latex Concentration

To the varied uses of soap in latex treating and compounding may be added its employment in a new method for concentrating. A major step in such a process, according to U. S. Patent 2,371,560, consists of adding to normal latex a carefully determined amount of soap and the acid sulfuric ester of octodecyl-lactate. Latex treated with these materials is then passed through a centrifuge adjusted to produce a high concentration. Thus it becomes possible, without clogging the apparatus, to produce a cream of better mechanical stability than that which could be obtained at the same centrifuge adjustment without the soap and the oleyl ester. The patent, granted to G. J. van der Bie, is now vested in the Alien Property Custodian.

Constructs Plant in Cuba

Goodyear Foreign Operations, Inc., a subsidiary of the Goodyear Tire & Rubber Co., has announced the construction of a tire plant at San Jose de las Lajas, Cuba, about twenty miles from Havana. The new Cuban plant will be a small manufacturing unit operated by the Goodyear Tire & Rubber Company of Cuba for the production of popular size tires and tubes, repair materials and heels. It is modeled after two other small factories operated by Goodyear at Cali, Columbia, and Caracas, Venezuela. Richard P. Morgan, who has been manager of the Goodyear plant in Venezuela since 1938, has been appointed general manager of the Cuban plant, while Marvin A. Ryan, division superintendent of the Goodyear plant in Brazil since 1942, has been named factory superintendent. Eugenio Riveroll is treasurer.

To Produce Bicycle Tires

Goodyear Fabric Corp., a subsidiary of the Goodyear Tire & Rubber Co., has completed plans for the production of bicycle tires at its plant in New Bedford, Mass. Approximately 10,000 bicycle tires a day are expected to be manufactured at the plant. Other products produced at the New Bedford plant include camelback, repair material and sectional airbags for tires, fuel cells for planes, and life rafts and vests for commercial use.

New Company Formed

The Page Manufacturing Co., Inc., is the name of a recently organized firm at 57 Swan St., Medford 55, Mass., which is engaged in proofing and combining of materials for the shoe industry. Hillman L. Porter, formerly associated with the U. S. Rubber Co., is factory manager of the concern.

GERMAN BLACK SUBSTITUTE DESCRIBED IN OPB REPORT

A new German process for production of super-fine silicon dioxide through combustion of silicon tetrachloride is described in a report released recently by the Department of Commerce. The product is reported potentially useful as a substitute for carbon black in rubber. The process, developed to the pilot plant stage by a German metallurgical concern, involves chlorination of ferrosilicon and condensation of resulting vapors. The vapors contain silicon tetrachloride, together with appreciable amounts of ferric chloride and smaller amounts of aluminum, titanium and other chlorides.

After purification, the silicon tetrachloride is mixed with air and hydrogen and burned under a slowly revolving aluminum drum. The "soot" of silica is deposited on the drum. Highly uniform silicon dioxide particles of extremely small size (0.1 to 1.0 microns in diameter) are made by this method. The product has a low refractive index, is inert to chemical action and has an extremely large surface per unit weight.

The silicon dioxide was intended primarily for use as a filler for white rubber goods. Rubber compounds in which it was substituted directly for carbon black were said to be equal or superior to compounds containing carbon black, except for abrasion resistance. The production method and apparatus are described in detail in the report, PB-22624, which may be obtained from the Office of the Publication Board, Department of Commerce, Washington 25, D. C., for $2 in photostat form and 50 cents in microfilm form.

Manhattan Honors Pioneers

Three fifty-year pioneers were honored, fourteen twenty-five year employees were introduced as pioneers, and Gold Service Pins were presented to approximately 300 other Manhattan pioneers at the second annual dinner for veteran employees of the Manhattan Rubber Manufacturing Division of Raybestos-Manhattan, Inc., held at Mountain View, N. J., on May 26. The dinner was attended by nearly 500 pioneers and their guests. Charles T. Young, formerly factory manager, and Andrew J. Gibson and John Dotterweich, plant employees, were honored as fifty-year employees. Among the speakers at the dinner were Harry E. Smith, Charles T. Young and Grannell E. Knox.

Division to Meet in Chicago

The Fall Meeting of the Division of Rubber Chemistry, A.C.S., will be held in Chicago, Ill., in conjunction with the 110th meeting of the parent society. The Division will hold a three-day meeting, from Wednesday, September 11, to Friday, September 13. Headquarters for the Division will be the Hotel Sherman. Further details will be announced shortly.

NAMES IN THE NEWS

DR. E. T. LESSIG, associated with the B. F. Goodrich Co., Akron, since 1931, spending most of his time on textile research, has been named manager of textile control in the company's tire division.

ROBERT P. RUSSELL, president of the Standard Oil Development Co., central research organization of the parent Standard Oil Company (New Jersey), has received the 1946 Gold Medal of the American Institute of Chemists for "noteworthy and outstanding service to the science of chemistry," particularly for his wartime achievements in the production of synthetic rubber, aircraft fuels and explosives.

C. P. JOSLYN, manager of the chemical products division of the Goodyear Tire & Rubber Co., Akron, has been awarded a 20-year service pin by the company.

DR. CRAWFORD H. GREENEWALT, assistant general manager of the Pigments Department of E. I. du Pont de Nemours & Co., has been appointed a vice-president and member of the company's executive committee, succeeding JASPER E. CRANE who retired recently.

WILLIAM S. WILSON, formerly manager of the war products division of the Firestone Tire & Rubber Co., has been named assistant manufacturer's sales manager by the company, with headquarters in Akron.

GEORGE F. KAHLE, who served with the Office of the Chief of Ordnance for the past three years, handling production safety in munitions manufacturing plants, has joined the Heyden Chemical Corp. as a representative in the Chicago, Ill., area.

WARD KEENER, formerly assistant to the president of the B. F. Goodrich Co., Akron, has been elected a vice-president and head of the company's recently-created employee relations division.

RUSSELL DE YOUNG, who served throughout the war period as vice-president in charge of production for the Goodyear Aircraft Corp., a subsidiary of the Goodyear Tire & Rubber Co., has been appointed vice-president and general manager of the subsidiary organization.

SHELDON P. THACHER, manager of the tire engineering and special brand sales departments of the U. S. Rubber Co. at Detroit, Mich., has been awarded a gold lapel insignia set with a diamond by the company's safety department for his safe driving record of 33 years without an accident.

E. J. THOMAS, president of the Goodyear Tire & Rubber Co., Akron, has been awarded a 30-year service pin by the company.

GEORGE P. LEHMANN, who has been serving as staff assistant to the manager of the plastics division of the General Electric Co. at Pittsfield, Mass., since his discharge from the Army with the rank of colonel last fall, has been appointed assistant manager of the division.

WALTER SCHULTZ, formerly factory superintendent of the Master Tire & Rubber Co., Findlay, Ohio, has joined the Pharis Tire & Rubber Co., Newark, Ohio, where he will work on special production problems.

FREDERICK H. WEISMULLER, director of sales for the pigments department of E. I. du Pont de Nemours & Co., Inc., Wilmington 98, Del., since 1944, has been appointed assistant general manager of the department.

K. D. SMITH, vice-president of the National-Standard Co. and who served most recently as plant manager of the company's Worcester Wire Works Division in Worcester, Mass., has returned to Akron where he will represent the company as a consultant for the rubber industry.

HARRY E. BLYTHE, who recently resigned as vice-president and general manager of the Goodyear Aircraft Corp., has been named president of the Buffalo Weaving & Belting Co., Buffalo 7, N. Y.

LOUIS F. WEYAND, general manager of the adhesives and coating division of the Minnesota Mining & Manufacturing Co., St. Paul 6, Minn., has been elected a vice-president of the company.

HARRY E. COOPER, formerly a superintendent of the Providence, R. I., plant of the U. S. Rubber Co., with supervision over the production of rubber thread, Lastex yarn, Laton yarn and Lyntron cut thread, has been appointed manager of the company's Lastex yarn and rubber thread division.

L. L. FORTUNE, formerly associated with the Firestone Tire & Rubber Co., recently joined the Fremont Rubber Co., Fremont, Ohio, as production manager.

E. P. LAMBERT, owner of E. P. Lambert Co., First Central Tower, Akron 8, Ohio, and a director of the South Asia Corp., 80 Broad St., New York 4, N. Y., importers of crude rubber, has been elected vice-president of the latter concern.

Myron T. Bennett

whose appointment as vice-president in charge of sales of the United Carbon Co. was announced last month. Mr. Bennett makes his headquarters at Charleston, West Virginia.

WILLIAM L. JENKINS, associated with the B. F. Goodrich Co., Akron, since 1940, most recently as an experimental engineer, has been appointed manager of the company's recently-created electronic applications development department.

P. W. LITCHFIELD, chairman of the board of the Goodyear Tire & Rubber Co., Akron, was awarded an honorary doctor of science degree at the University of Akron commencement on June 14.

DR. ROBERT P. PARKER, associated with the Calco Chemical Division of the American Cyanamid Co. in Bound Brook, N. J., since 1933, most recently as assistant director of the organic section of the research department, has been appointed assistant to the research director of the Division.

ALBERT K. DANNENBAUM, president of the Aldan Rubber Co., Philadelphia, Penna., has been elected chairman of the coated materials division of the Rubber Manufacturers Association, succeeding HOWARD M. SAWYER.

EDWARD F. CASEY, formerly plant superintendent of the Converse Rubber Co., Malden, Mass., has been elected vice-president in charge of production. JERE O'NEIL, assistant factory manager since 1929, has become plant superintendent.

Chexflo Valve, which consists of a synthetic rubber tube stretched over a cup-shaped metal core with slotted sides, has been developed by the Grove Regulator Co., Oakland, Calif., to permit fluid flow in one direction in a pipeline but prevent flow in the reverse direction.

New German Technical Report

The report of the special group sent to Germany late last year to investigate German synthetic rubber research has been declassified by the Army and the Navy and a limited number of copies have been prepared by the Office of Rubber Reserve, Reconstruction Finance Corp., Washington, D. C. The Office of the Publication Board, Department of Commerce, which distributes some of these reports, is planning to make the current report available in microfilm or photostatic copies within the next several weeks. Two important research leads uncovered in the investigation are contained in the report, these being the Buna S-4 development at Ludwigshaven and the Redox system of polymerization developed at Leverkusen. Under the Redox method, the process of production can be completed in 2 to 3 hours instead of the 12 to 14 hours usually needed, and may prove a step towards a continuous process of making synthetic rubber, while the Buna S-4 is said to require less heat-softening than other types of German synthetic. The group making the investigation included C. S. Marvel (University of Illinois), A. M. Clifford (Goodyear), J. N. Street (Firestone), H. L. Trumbull (Goodrich), G. R. Vila (Naugatuck Chemical), and E. R. Weidlein, Jr. (Office of Rubber Reserve). (EDITOR'S NOTE: More complete descriptions of the Redox method and of Buna S-4 will appear in an early issue.)

Pliofilm for Frozen Foods

Goodyear Tire & Rubber Co., Akron, has developed and has started production of a new type of Pliofilm particularly adapted for frozen foods. The new material, known as FF Pliofilm, is said to remain flexible at —20° F. and to possess the same heat-sealing qualities as conventional Pliofilm. In addition it can be sealed against the frozen product. The company is planning to supply locker plants and users of home freezer units with the new Pliofilm in rolls of convenient widths for packaging meats and poultry and as carton liners for the many types of loose foods to be frozen.

Gulf Unit to Sell Tires

Gulf Tire & Supply Co., a new subsidiary of the Gulf Oil Corp., Gulf Building, Pittsburgh, Penna., has been organized to handle a new line of branded tires, tubes, batteries, and automobile accessories. At the present time merchandising is reported to be on a very small scale due to difficulties in obtaining sufficient supplies. Included in the list of new Gulf-branded accessories that will be featured are tires (of both passenger and heavy service truck types), tubes, batteries of all standard types and sizes, fan belts, battery cables, and tube repair kits.

Production Prediction

The value of goods produced by the rubber manufacturing industry is estimated at $1,750,000,000, an increase of 87% over the previous peacetime peak year of 1940 when the value reached $940,000,000, according to Herbert E. Smith, president of the U. S. Rubber Co. More than half of the record output will be accounted for by tires, the current trend of production indicating that between 85,000,000 and 90,000,000 tires will be made.

Nuocide Fungicide Concentrates

A line of fungicide concentrates designed to meet every mildew or rot proofing need has been developed and introduced by the Nuodex Products Co., Inc., 594 Magnolia Ave., Elizabeth, N. J. Marketed under the trade-name of "Nuocides," these new fungicides are reported to impart longer life and mildew resistance to both the fabric backing and finished coatings of rubberized fabrics, artificial leather, resin-coated fabrics, oil cloth, and shade cloth. The complete Nuocide line includes both solvent and water-soluble types, some arresting or inhibiting microbial growth and others destroying the microorganisms.

Nine Receive Naval Citation

Nine members of the technical staff of the U. S. Rubber Co. have been cited by the Navy Department for exceptional service in ordnance development during the war. Those receiving the awards were: Dr. R. H. Gerke, J. M. Mead, G. C. Holroyd, E. T. Rainier, V. L. Burger, K. M. Webb, J. R. Wells, N. C. Tilley and Harold Weigold. All were engaged in research and development at the company's shell-loading plant at Charlotte, N. C., and according to the citation were given the awards for "development methods of loading bright tracer, dark tracer and dark ignition tracer for 40-mm. ammunition."

Agchem RC-30 Resin Emulsions

A new series of resin emulsions, under the name of Agchem RC-30, has been offered by Agawam Chemicals, Inc., West Springfield, Mass. The new emulsions are completely compatible with Neoprene Type 571 and 572 latices and with Type 3 GR-S latex. They are reported to be particularly suitable as tackifying agents for developing high initial tack and retained tack in neoprene latex compounds as well as for improving the combining powers of latex adhesives, especially in delayed combining operations. A technical bulletin on the new emulsions is available from the company.

Use of Mooney Viscometer

As part of its work on the viscosity of synthetic rubbers, the National Bureau of Standards has been utilizing the Mooney viscometer. Experience with the operation of this viscometer in 18 laboratories indicated the need for better reproducibility of results. In a special circular (C-451), Rolla H. Taylor gives his conclusions after studying the available data from these laboratories, together with reports of numerous experiments made at the Bureau. These experiments have brought out the factors that must be considered if reproducibility is to be improved. It is pointed out that if uniformity in the values of Mooney viscosity on the same sample, with different viscometers and in different laboratories, is to be obtained, the methods of adjustment that must be followed and the precautions that must be taken are cleaning; mechanical calibration; dimensions of dies, die holders and rotors; die closures; and preparation of test pieces. Copies of Circular C-451 may be obtained from the Superintendent of Documents, Washington 25, D. C., at five cents each.

New Automotive Publication

The twenty-sixth edition of "Automobile Facts and Figures," covering the years 1944 and 1945, has been made available by the Automobile Manufacturers Association, New Center Building, Detroit 2, Mich. Topics covered include war production in the automobile industry; traffic trends on rural highways; average daily gasoline usage; yearly mileage built by state highway departments; allocation of Federal highway funds; motor vehicle and gasoline taxes; motor vehicle production, exports and registrations; and traffic fatalities. A list of associations of the automobile industry is also given.

Make Normal Heptane Available

The availability at comparative low prices in drum or tank car quantities of normal heptane of exceptional high purity has been announced by the Chemical Products Department of the Phillips Petroleum Co., Bartlesville, Oklahoma. Preliminary examination of production stream samples is reported to indicate the purity of the normal heptane to be over 99 mol per cent. Traces of other hydrocarbons in the newly available material are considered to be chiefly 3-methylhexane or methylcyclohexane or both.

Seeks Agency in China

Paul Chen & Co., 73A Tsu Shin Pu St., Peiping, China, commission merchants for importers and exporters, are interested in hearing from American rubber goods manufacturers who are seeking representation in China.

Monsanto Develops Fungicide

A textile preservative, which is said to afford durable protection to fabrics, including rubberized coated materials, plastic coated textiles and certain tapes, against airborne superficial and rotter-type fungi as well as against soil inhabiting organisms, has been developed by the Monsanto Chemical Co., St. Louis 4, Mo. To be marketed under the trade name "Milmer," the preservative was developed from a 66-year-old German chemical compound known as Copper 8-Quinolinolate, sometimes referred to as the copper salt of 8-Hydroxyquinoline. The company emphasizes that the preservative is to be used for mill application only, and that there is little likelihood of its use to treat fabrics inside homes. Weather exposure, sunlight and laundering are reported to have little or no effect on its performance as a textile preservative.

Establishes New Department

Hall Laboratories, Inc., Pittsburgh, Penna., consultants in conditioning of industrial waters, has established a special department to handle problems of industrial waste and stream pollution. The new department will be headed by Charles F. Hauck, until recently engineer at the Ravenna Ordnance Center and previously senior chemist and assistant superintendent of Southerly Sewage Treatment Plant, Cleveland, Ohio. Among the industries concerned with waste disposal problems are rubber, chemical and petroleum refining.

New Consulting Concern

Dayton Chemical Products Laboratories, 1150 W. 2nd St., Dayton, Ohio, was recently established to do consulting, research and development in all fields of applied chemistry, with particular emphasis on problems involving rubber adhesives, the bonding of rubber to metal and other materials, and adhesives and adhesion problems in general. Stewart L. Brams, recently resigned as supervisor of the cement laboratory of the Inland Manufacturing Division of General Motors Corp., in Dayton, Ohio, heads the new concern.

New Treatment for Fabrics

A chemical treatment for fabrics, known as "Permaproof," is under development by the B. F. Goodrich Co., Akron, and the Treesdale Laboratories, Pittsburgh, Penna. The chemical treatment, it is reported, will render any sort of fabric mildewproof, waterproof and flameproof without having any "tenderizing" effect on the base fabric, and no disturbing effect upon fancy colors or patterns. It is said to work outdoors as well as indoors, and can be applied by dip, spray, or paint.

Fuller Houses

Rubber will play an important role in the manufacture of the hemispherical, one-story, single family, mass produced homes planned by Fuller Houses, Inc., Wichita 2, Kansas. These houses are 36 feet in diameter, 22 feet high, weigh 8,000 pounds, and utilize aluminum for the outside walls and roof. Rubber stripping will be used in a circle of approximately 683 inches perimeter just beneath the ventilator of the house. Other rubber possibilities in the new house are mountings, cable clamps, grommets for wiring, sound deadening strip between ceiling carling and corrugated partition, and numerous sealing strips.

Develops Rubber Mail Bag

Air cargo ranging from eggs to hardware can be dropped from a speeding plane without damage in a new rubber mail bag developed by the U. S. Rubber Co. for carrying mail to small communities off the beaten path. The bag, heavily reinforced to withstand severe punishment, may be picked up or dropped in small areas without a landing, thus bringing air mail service to places having inadequate airport facilities or none at all.

Seeks Agencies in Bulgaria

The Bulgarian Political Mission to the United States is anxious to hear from American rubber manufacturers and dealers who are interested in establishing business relations in Bulgaria. Information about Bulgarian firms can be obtained by writing to B. Athanassov, Secretary to the Bulgarian Political Mission to the United States, Shoreham Hotel, 2500 Calvert St., N.W., Washington, D. C.

Manufacture Neolite Heels

Neolite heels have been placed in production by the Goodyear Tire & Rubber Co. at its factories in Windsor, Vt., St. Mary's, Ohio, and Gadsden, Ala., to supplement its line of Neolite soles. The soles, widely used by shoe manufacturers, were introduced to the shoe repair trade last September, while the heels are expected gradually to enter repair channels as production increases.

Sun Rubber has introduced a new battery filler that features an extra-long nozzle to provide easy access to hard-to-reach batteries. Designed to stand up under the deteriorating action of acids and petroleum products, the filler will retain its shape because of an interior reinforcing band. Positive leak-proof action is another feature.

Develops Packaging Machine

A new type of packaging machine adapted for high speed wrapping of a wide variety of regular or irregular shaped articles of varying sizes has been developed by the Goodyear Tire & Rubber Co., Akron. The machine passes Pliofilm over electrically heated rollers and between two high speed Airfoam belts which cushion the plasticized film tightly around surfaces of the object, at the same time forcing all the air from within the formed enclosure. The machine is designed so that the belts may travel at speeds up to 300 feet a minute.

Forms New Distributing Company

Louis K. Braunston, recently resigned vice-president and general manager of the Miller Products Co., has organized his own company, Moldex Rubber & Plastics Corp., 1 East 57th St., New York, N. Y., to serve general industrial manufacturers who use molded and extruded rubber and plastic products, gaskets and coated fabrics. Associated with Mr. Braunston, who is president of the company, is Arche A. Mayers as vice-president, and George J. Wilson, plastics engineer.

Develops Toilet Flush Ball

A new toilet tank flush ball, consisting of a neoprene base, a polystyrene plastic top, and patented expandable plug, has been developed by the Rayco Co., Factory St., New Haven 11, Conn. The rubber base is so molded that uniform wall thickness is maintained, which makes it possible for one ball to fit all size valves. The plastic top is used to strengthen the walls and guarantee the ball's contour, while the plug is used as a connection to the lifting rod thereby eliminating the possibility of stripped threads.

Technical Bulletins Available

Armeens, Armids and Arneels, chemical compounds produced from fats by the Armour Chemical Division of Armour & Co., 1355 W. 31st St., Chicago 9, Ill., are covered individually in three technical bulletins made available by the company. The company recommends these chemicals for use as softeners, plasticizers and processing aids in Buna N, polyvinyl chloride acetate copolymers and polystyrene resins. Composition, constants, chemical properties and typical uses are described.

Palmalene Made Available

A new palmy acid of medium titre, known as Palmalene, which can be used in rubber compounding, has been made available by the Beacon Co., 97 Bickford St., Boston 30, Mass. According to the company, Palmalene's specifications include a saponification number of 180-185, an iodine value of 55-60, and a titre of 30.

NEW POLYMERS AUTHORIZED BY OFFICE OF RUBBER RESERVE, RECONSTRUCTION FINANCE CORPORATION

Listed below are types and properties of new experimental GR-S polymers (including GR-S latices) which have been authorized by the Office of Rubber Reserve, Reconstruction Finance Corporation, since publication of those listed in our preceding issue. Procedures for the distribution and sale of these polymers will be found in our October, 1945, issue.

X-Number Designation	*Manufacturing Plant*	*Date of Authorization*	*Polymer Description*	*Special Characteristics*
X-304-GR-S	National, Louisville	4/24/46	High styrene content GR-S emulsified with Daxad and rosin acid soap, carried to a high conversion, short-stopped with hydroquinone and stabilized with 1.5 parts Stalite.	To be used in tape manufacture.
X-306-GR-S	Firestone, Akron	5/20/46	Regular GR-S AC, modified with a mixture of DDM and mixed tertiary mercaptans.	This polymer is being made and tested at the present time in view of the possible future shortage of DDM.
X-308-GR-S Latex	U. S. Rubber, Naugatuck	5/13/46	GR-S Type II latex emulsified with Daxad; 40-50 Mooney; 55-60% solids.	General purpose latex.
X-309-GR-S Latex	Goodrich, Louisville	5/15/46	Type II latex with formulation especially developed for better tire cord adhesion.	
X-310-GR-S Latex	U. S. Rubber, Naugatuck	5/15/46	High styrene content GR-S latex emulsified with Daxad, carried to a high conversion, 55-60% solids.	General purpose use.
X-311-GR-S	Firestone, Akron	5/29/46	Regular GR-S AC except that this polymer contains 1.5% Ajone C anti-oxidant.	This polymer is being made to test a new antioxidant in GR-S.
Reauthorizations have been issued for the following polymers which were previously authorized, made and in consumers' tests found advantageous:				
X-181-GR-S	U. S. Rubber, Institute	4/26/46	Regular GR-S-85 produced at lower than normal conversion.	This material should have a lower quantity of looser gel than std. GR-S-85, and thus may be more susceptible to solvent swelling and processing. Its Mooney plasticity, however, is similar to GR-S-85.
X-222-GR-S	Firestone, Akron	5/24/46	Alum coagulated GR-S made with dehydrogenated rosin soap.	Polymers made with dehydrogenated rosin soap show a quality advantage, i.e., better tack.
X-245-GR-S	U. S. Rubber, Institute	4/26/46	GR-S with a high styrene content, 1.5 non-staining antioxidant, 0.15 sodium sulfide, alum coagulated.	This polymer should have superior physical properties in non-black stocks, but poor freeze resistance.
X-250-GR-S	Goodrich, Louisville	5/24/46	Regular GR-S at 45±5 Mooney, shortstopped with hydroquinone, no anti-oxidant.	General purpose use.
X-272-GR-S	U. S. Rubber, Institute	4/26/46	Rosin soap GR-S made to high conversion, and stabilized with 1 part Stalite; 95-105 Mooney; acid coagulated.	This rubber has good adhesiveness and cohesiveness imparted to it by its high Mooney viscosity and the use of rosin soap; thereby making it useful in adhesives and footwear stocks.
X-281-GR-S	Goodrich, Borger	5/16/46	Polyisoprene	Produced for uses as an intermediate material in chlorinated and other chemically treated end products. Similar in chemical properties to natural rubber.
X-285-GR-S	U. S. Rubber, Naugatuck	5/3/46	Butadiene/styrene polymer with an auxiliary chemical to produce high gel content in the polymer, shortstopped with hydroquinone and stabilized with 1.5 BLE; salt acid flocculated; 60 Mooney viscosity.	This material should show superior processing and very low shrinkage characteristics. For use in footwear stocks, wire insulation, extruded mechanical goods and other type of product where these characteristics are desired.
X-292-GR-S	U. S. Rubber, Institute	4/26/46	Masterbatch containing 100 parts Buca A Clay and 100 parts of a GR-S type polymer made with sodium sulfide shortstopper, 40 Mooney viscosity, 1.5 parts EFED.	Clay masterbatches are reported to have superior processing and handling characteristics. For use in stocks requiring this type of material.

FINANCIAL NEWS

Dayton Rubber Mfg. Co.

Six Months Ended April 30: Net profit of $598,781, which is equal to $1.22 a share on each of the 453,341 common shares. Net profit for the corresponding six months of the previous fiscal year is not comparable because of the effect on results of that period of action taken on September 29, 1945, accelerating depreciation of emergency facilities. Net sales amounted to $14,123,857 in the latest period, as compared to $12,739,213 for the similar period in the previous fiscal year.

A. G. Spalding & Bros., Inc.

Six Months Ended April 30: Net income of $465,000, which compares with $335,000 for the corresponding period of the previous fiscal year. After redeeming 567 shares of preferred stock on January 28, and exchanging the remaining 16,393 shares of the preferred for common stock at the rate of four shares of common for each share of preferred, the company's capital consists of 520,575 shares of common stock and $3,281,200 of 50-year, 5 per cent debentures due November 1, 1989.

American Cyanamid Company

First Quarter: Net income of $1,886,043, which is equal, to 63c each on 2,707,026 common shares, and which compares with $1,648,285, or 54c a share, for the similar period in the previous year.

Columbian Carbon Company

First Quarter: Net income, including capital gains of $188,556, amounted to $1,267,783, which is equal to 79c each on 1,612,218 common shares, and which compares with $953,730 for the similar period in the previous year.

United Carbon Company

First Quarter: Net income of $678,301, which is equal to $1.70 a share, and which compares with $496,958, or $1.25 a share, for the similar period in the previous year.

Thermoid Company

First Quarter: Net income of $35,210, which is equal to 1c a common share, and which compares with $287,742, or 44c a share, for the similar period in the previous year.

Anaconda Wire & Cable Co.

First Quarter: Net income of $6,233, which is equal to 1c on each of the 421,981 common shares, and which compares with $273,062, or 65c a share, for the similar period in the previous year.

Lee Rubber & Tire Corp.

Six Months Ended April 30: Net income of $1,146,105, which is equal to $4.74 a share, and which compares with $776,028, or $3.21 a share, for the similar period of the previous fiscal year. Net sales amounted to $14,493,097, against $15,250,583 for the same period of the previous fiscal year.

Hewitt-Robins, Inc.

First Quarter: Net loss of $417,772, which compares with a net profit of $129,420 for the similar period in the previous year. The statement for the 1946 period does not reflect a carry-back tax refund.

Raybestos-Manhattan, Inc.

First Quarter: Net income of $224,548, which is equal to 36c a share, and which compares with $332,133, or 53c a share, for the similar period in the previous year.

Voelker Gets Service Award

Russell F. Voelker, of the Field Service Division of the Office of the Quartermaster General, has been awarded the Exceptional Civilian Service Award by the War Department in recognition of his "vital contribution in the acquisition, accumulation and conservation of strategic raw material which made available a stockpile of crude rubber." In October, 1939, Mr. Voelker was appointed supervisor in charge of inspection and storage of the crude rubber accumulated by the Commodity Credit Corporation and stockpiled by the Quartermaster General of the Army.

Stock Offered Management

Stockholders of the Brown Rubber Co., Inc., have approved a management stock purchase plan whereby 25,000 shares of new Class B stock were authorized. Members of the management will have until September 1 to purchase the shares at $5 each, with the additional provision that no shares may be sold until July 1, 1948.

Panther-Panco Purchases Plant

A partially completed rubber plant in Chelsea, Mass., has been purchased from the Government by the Panther-Panco Rubber Co., Inc., manufacturers of rubber soles and heels, for $800,000. Panther-Panco was to have operated the plant for the Government.

Approve New Financing Program

Stockholders of the General Tire & Rubber Co. have approved a new financing program which is expected to furnish the company an estimated $4,890,700 with which to cover expenditures for recent acquisitions, repay bank loans and increase working capital. An increase from 85,000 to 150,000 shares of the present preferred stock in two issues was authorized. One issue of 3¾ per cent cumulative preferred stock is subject to redemption at 104¾ until April 1, 1949, and at lower prices thereafter; it is redeemable for the sinking fund beginning in 1949 at 102¼. The other issue of 3¼ per cent second preferred stock is convertible into common stock at a price of $65 a share until April 1, 1951, and at $70 a share thereafter until April 1, 1956, when the conversion privilege expires; it is subject to redemption at 102½ until April 1, 1949, and at lower prices thereafter.

Develop Goodrich Automobile

In an effort to demonstrate that its Torsilastic rubber springs are not only practical but economical on passenger cars, the B. F. Goodrich Co. unveiled a special automobile, designed and built by its engineering department, at Detroit recently during the golden jubilee celebration of the automotive industry. A hybrid, the special car was composed of parts from various standard automobiles, with certain engineering changes made to accommodate the rubber springs. For example, the Goodrich car featured independent four-wheel suspension. The car, which has a 104-inch wheelbase, also featured a new size tire, 6.00x14.

Denman Registers Stock Issues

Denman Tire & Rubber Co., Warren, Ohio, has filed a registration statement with the Securities and Exchange Commission covering the issue of 50,000 shares of $10 par value 5 per cent cumulative convertible preferred stock and 95,000 shares of $1 par value common stock. The preferred stock will be offered to the public at $10 a share and the common shares will be offered at $8 a share. The company expects to use approximately $100,000 of the net proceeds from the sale of the stock to improve its plant to increase tire production.

Goodyear Issues Sales Report

A quarterly report on sales was recently issued for the first time by the Goodyear Tire & Rubber Co., Akron, in conformance with a regulation by the Securities & Exchange Commission. Volume of sales in the first three months of this year amounted to $124,794,000, a new record for peacetime operations. This compared with $67,882,000 in the first quarter of 1941 and $208,000,000 in the initial quarter last year when 85 per cent of the volume represented Government contracts.

Carbon Black Price Hearing

Domestic prices of carbon black during the period 1934 to late 1937 were unchanged, although prices to foreign buyers during that period declined progressively, it was disclosed on June 7 at the closing session of the Federal Trade Commission's examination of Carbon Black Export, Inc. The hearings, which began on June 3 in New York City before a trial examiner, are part of a series of investigations of export associations operating under the Webb-Pomerene Act, now being conducted by FTC. During the testimony it was brought out that foreign prices on carbon black during the period were controlled legitimately, in accordance with terms of the act, but witnesses of the corporation denied that domestic prices were controlled. The contention of FTC was that, since competition normally forces prices downward under ordinary conditions, and in the controlled foreign market where prices may have remained rigid they actually declined, prices in the domestic market should also have declined, unless the industry combined to maintain rigid levels. This condition existed, it was claimed, even after the National Recovery Administration codes permitting price maintenance were discontinued in 1935.

Polymer Study Clinics Offered

To provide a direct service for chemical industries, the Institute of Polymer Research of the Polytechnic Institute of Brooklyn, Brooklyn, N. Y., will offer a series of five summer laboratory clinics on a graduate level in the field of polymer science. The first clinic, from June 21 to June 28, will be held on "Weight and Shape of Polymer Molecules in Solution." The other clinics include a second session on "Weight and Shape of Polymer Molecules in Solution," from July 15 to July 19; "Industrial Applications of X-Ray Diffraction," from August 12 to August 23; "Advanced X-Ray Diffraction Course," from August 26 to August 31; and "The Preparation of High Polymers in Bulk, Solution, Suspension and Emulsion," from September 2 to September 6.

Acromark Develops New Inks

New inks for trademarking and imprinting on synthetic or natural rubber and plastics, as well as for marking enamel, lacquer and insulated wire and cable, have been developed and are being manufactured by the Acromark Co., 100 Morrell St., Elizabeth, N. J. The inks are available in either liquid or paste forms in a variety of colors. The liquid inks may be applied by hand or machine, in standard liquid type ink fountains, and are furnished in various drying characteristics to suit the application. The paste form inks may also be applied by hand or in ink feeds much the same as regular printers' ink.

Remember When?

The Duryea No. 37, one of the oldest cars to take part in the Automotive Golden Jubilee at Detroit, undergoes a

tire inspection by H. J. Collier, manager of the tire construction division of United States Rubber Company's development department, prior to its entry in the Motor City Cavalcade on June 1. Tires are replicas of the first pneumatic tire developed for the Duryea brothers in 1895 by the Hartford Rubber Works, which later became a part of the U. S. Rubber Company. The replicas were made last year for use in a reenactment of the Chicago Times-Herald race of antique automobiles.

Two New Dutrex Materials

Two new Dutrex materials—Dutrex 30, a light process oil for neoprene, and Dutrex 15E, a general-purpose plasticizer for natural and synthetic rubber—have been introduced by the Shell Oil Co., Inc., 50 West 50th St., New York 20, N. Y. Tests conducted with Dutrex 30 are reported to indicate that it has an unusually high compatability with neoprene, enabling it to be used in higher proportions than other process oils tested. Dutrex 15E is a modified asphaltic-type plasticizer. Technical reports have been prepared on both new materials and may be secured without cost from the manufacturer.

Cold-Dip Plastic Dyes

Cold-dip plastic dyes, under the trade name of "Rez-N-Dye," some of which find application in connection with the coloring of latex products, are featured by the Schwartz Chemical Co., 326 West 70th St., New York 23, N. Y. Use of the dyes consists merely of immersing the rubber or plastic object for a short time, then rinsing in water. The time required depends on the depth of color desired, an instant dip resulting in pale tints such as pink and baby-blue, while darker shades require two to three minutes. The dyes are available in a number of colors.

Testing Apparatus for Plastic

An improved testing apparatus for determining heat distortion properties of plastics is described in a report released recently by the Department of Commerce. Research on the apparatus was done during the war for the National Defense Research Committee by the Laboratory of Insulation Research at the Massachusetts Institute of Technology. The perfected apparatus can be used to determine the limiting heat distortion temperature of plastics by the method specified by the American Society for Testing Materials. In addition, the apparatus embodies certain refinements in design which permit continuous recording of the distortion as functions of time and temperature. The report may be ordered from the Office of the Publication Board, Department of Commerce, Washington 25, D. C., for $1 in photostat form or 50c in microfilm form.

Tire Patches for Sale

Approximately 1,000,000 tire patches, ranging in size from 6-2-8 to 12-6-16 and packed from 25 to 250 per box, have been offered for sale at 50c each by the War Assets Corporation. Made of new cotton cord, with Holland or varnished cambric backing, these patches are priced low because they are not molded to contour and are aging. Some do not have a cushion gum strip on edges. Detailed information regarding the purchase of these tire patches is contained in a folder, called "Tire Repair Materials," which can be obtained by writing to any one of the regional offices of the Consumer Goods Division of the War Assets Administration.

Form Wise Allied Products, Inc.

Wise Allied Products, Inc., has been organized at Ada, Ohio, by R. M. Wise and R. E. Mock. Mr. Wise, who has had more than 10 years of experience in the rubber engineering field, will be president and treasurer, and Mr. Mock, whose experience in the field covers more than 23 years, will be vice-president and factory manager. Products to be made include molded goods and toys. Plans are also being made for the production of extruded goods as well. The plant will employ approximately 50 workers once in full production.

New Firestone DeLuxe Tire

A new Firestone DeLuxe Champion tire, said to be the safest and longest wearing tire ever built, has been introduced by the Firestone Tire & Rubber Co., Akron. Containing eight circumferential ribs, the new tire has a wider and flatter tread. Rayon cord is being used in all tires of the 6.50 size and larger, while tires smaller than the 6.50 size will be built with cotton cord bodies until rayon is available for all sizes.

CANADIAN NEWS

C. D. Howe, Minister of Reconstruction, has introduced a measure in the Canadian House of Commons which would expand Canada's research work by enlarging the personnel of the National Research Council. The measure calls for the addition of two vice-presidents to the Council, one to take charge of administration and another to deal with research, and it also calls for keeping appointments to that staff independent of the Civil Service Act. During discussion of the measure on the floor of the House, Mr. Howe asserted that the Dominion-owned Polymer Corp. had been admitted to the "patent pool" which controls all rubber patents, on the understanding that Polymer would spend a certain amount on research and that the benefits would be turned into the pool.

Charges in the Canadian House of Commons recently that Polymer Corp. had been wasteful in the disposal of its property were countered by C. D. Howe, Minister of Reconstruction. Mr. Howe pointed out that up to March 31, 1946, the Polymer Corp. had returned as profit to the Government $10,000,000 of the $50,000,000 advanced by the treasury to establish the synthetic rubber industry.

W. R. Bailey, control manager of the footwear plant of the Dominion Rubber Co., Ltd., at Kitchener, Ont., since 1941, and previously manager of the industrial engineering and industrial relations departments at the same plant, has been appointed assistant factory manager.

E. C. Ansley and P. H. Dee have been appointed service manager and assistant treasurer, respectively, of the General Tire & Rubber Company of Canada. Prior to his appointment, Mr. Ansley was in charge of the company's production and stock distribution, while Mr. Dee served as credit manager.

Canadian Titanium Pigments, Ltd., has announced plans to construct a large plant at Cap de la Madelaine, Quebec, for the production of titanium dioxide. It is estimated that the plant will cost $5,000,000, and will employ approximately 250 workers.

Viceroy Manufacturing Co., Ltd., Toronto, Ont., has declared a dividend of 7c a share to stockholders of record on June 8.

Dow Chemical of Canada, Ltd., has under construction a polystyrene plant on a 120-acre site adjoining the government-owned styrene plant at Sarnia, Ont. The new plant, which is expected to be in production sometime this year, will cost $1,000,000. The company also plans to start construction of an additional $3,000,000 unit by the spring of 1947 for the production of ethylene glycol, which is used as motor antifreeze and in explosives. If chlorine, which is used in the production of ethylene glycol, is not available in sufficient supply, the company reports that it will build another $5,000,000 installation to supply it.

Granby Elastic Web Co. has announced that it will redeem its outstanding 5½ per cent preferred stock at $52.50 a share. On December 31, 1945, there were 8,569 preferred shares outstanding, with a par value of $50 a share. Capital for this financing will be derived from the sale of $350,000 worth of bonds, of which $200,000 will be 2½ per cent eight-year bonds and the balance 4 per cent fifteen-year bonds.

Canada Wire & Cable Co., Ltd., has declared a quarterly dividend of $1.00 a share on class A common stock, 25c on class B common stock, and $1.62½ per share on preferred stock, all payable on June 15 to holders on record as of May 31.

Goodyear Tire & Rubber Company of Canada, Ltd., has declared a dividend of $1.00 a share on common stock and a regular quarterly dividend of 62½c a share on preferred stock, both payable on July 2 to holders on record as of June 10. A similar payment was made on common stock on April 1, 1946.

G. T. Dickson, manager of the purchasing department of the Goodyear Tire & Rubber Company of Canada, Ltd., has been elected president of the Council of Canadian Purchasing Agents Association.

C. D. Howe, Minister of Reconstruction, stated in the Canadian House of Commons on May 29 that he felt it would be "prejudicial" to the policy of directors to give a day-to-day account for operations of the Dominion-owned Polymer Corp. Mr. Howe said the Polymer Corp. was in competition with foreign countries. If the Government is to remain in competitive business, he asserted, it should enjoy some of the privileges of private companies.

Harry F. Rau, traffic manager of the footwear plant of the Dominion Rubber Co., Ltd., in Kitchener, Ont., since 1941, has been appointed traffic manager of the company's tire factory in the same city, succeeding J. W. Kirkland. Mr. Rau was associated with Goodrich before joining Dominion Rubber in 1935.

Canada Wire & Cable Co., Ltd., has announced that the company will call its 6½ per cent cumulative preferred stock for redemption on July 15, 1946, and will issue $3,000,000 of 3 per cent debentures. On December 31, 1945, the company's balance sheet showed 25,000 shares of such preferred stock outstanding, with a total par value of $2,500,000. The preferred shares are callable on notice of 30 days at 107½ and accrued dividends. At the indicated redemption price, the amount required will be $2,687,500, exclusive of accrued dividends.

Monsanto Chemical Company of Canada, Ltd., Montreal, has agreed to purchase 6,000,000 pounds of styrene a year from the Polymer Corp., Sarnia, Ont. This is the second of several projected steps in the development of Polymer Corp. as the hub of a new chemical industry in Canada. The first such agreement was completed last year with the Dow Chemical Company of Canada, Ltd.

Dunlop Tire & Rubber Goods Co., Ltd., has declared a dividend of 2½ per cent on the 5 per cent redeemable first preference shares for the six month period ending June 30 to stockholders on record as of June 15.

Machinery and equipment have already been installed at the nearly completed fabricating plant of Canadian Resins & Chemicals, Ltd., at Shawinigan Falls, Quebec, and production is expected to start about July 1. At the new plant, the company plans to manufacture vinyl plastic sheeting of various thicknesses and colors, as well as extrusion and molding compounds, for use by the Canadian plastic industry.

Rayon Used in 6.50-16 Tires

Goodyear Tire & Rubber Co., Akron, has started production of all sizes of passenger car tires of 6.50-16 size and larger with an especially developed rayon cord known as Rayotwist. The company has indicated, however, that future production of tires with rayon cord would depend entirely upon the amount of rayon filament available and pointed out that present supply was limited to such an extent that continuous production of the sizes now being manufactured could not be promised definitely.

Body Engineers Society Formed

The American Society of Body Engineers, a new engineering society composed of leading body engineers in the automotive industry, has been formed, with national headquarters in the Rackham Memorial Building in Detroit, Mich. The society plans to hold a technical convention in October in the Rackham Memorial Building. I. Louis Carron, of the Detroit Harvester Co., is president of the organization.

NEW RUBBER GOODS

Morton Develops Tire-Trac

Tire-Trac, an emergency unit designed to provide traction on road surfaces where traction fails because of mud, sand, snow or ice, has been developed by the Morton Manufacturing Co., Chicago, Ill. Based on the half-track principle, the new unit provides traction by the tractive surface of seven rigid but flexible plates of two-ply steel, electro-welded and firmly linked together. A bumper cable, fastened to one end of the track, can be attached to the bumper, so that the device is carried along with the vehicle until the driver reaches a convenient place to stop and recover his Tire-Trac unit without risk of stalling. Made in two sizes, a light model for passenger cars and light delivery trucks is 6 inches wide and 22 inches long, while a heavy-duty model for trucks and busses is 12 inches wide and 50 inches long.

Hi-Way Lug Tire

A new type truck tire with special tread design to meet needs of vehicles that operate on and off highways has been put into production by the Goodyear Tire & Rubber Co. Known as the Hi-Way Lug, the new tire has a deep, non-skid, extra-heavy tread plus strength in the rayon cord body to provide the cut and bruise protection as well as traction and wearing qualities needed for the type of punishment taken by tires in logging, gravel operating and coal mining. The lugs in the tire are placed close together to provide extra traction.

Sunruco Protecto-Pad

An all-rubber pad with a raised grid-iron design for protecting the enamel surfaces of stoves, refrigerators, sinks and tables has been developed by the Sun Rubber Co., Barberton, Ohio. Called the Sunruco Protecto-Pad, the pad has been designed to protect enamel surfaces from chipping or scarring. It protects against scorching these surfaces because it keeps hot kitchen utensils off the surfaces and its perforated design dissipates heat rapidly. The pad is available in two sizes, a standard 15 x 17 inch pad, and an 8 x 17 inch made especially for center-burner stoves.

New Work Glove Developed

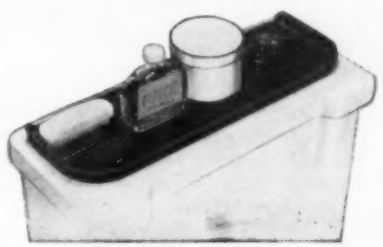
A canvas work glove, impregnated with oil-and-acid resistant milled neoprene, has been developed and is being manufactured by the Pioneer Rubber Co., Willard, Ohio. According to the manufacturer, the milled neoprene used in the glove is tougher and more durable than latex, and offers more protection on jobs that are too wet for other types of work gloves. The impregnating process is said to join the canvas and neoprene in a permanent bond, and results in a rough adhesive surface, giving the further advantage of a non-slip grip. Manufactured with both knit and gauntlet wrist, the glove is furnished in one standard size.

New Hard Surface Flooring

A new type of hard-surface floor covering has been developed by the Sloane-Blabon Corp., Trenton, N. J., under the technical supervision of the B. F. Goodrich Co. Made of Koroseal, Goodrich's plasticized polyvinyl chloride, the floor covering is expected to be available this summer in square flexible tile form and in a wide range of solid colors. Koroseal floor covering has been in joint development by Goodrich and Sloane-Blabon since early in 1940, and has made some excellent showings in accelerated wear tests. In one test simulating the "denting" effect of furniture casters, the Koroseal flooring is reported to have shown one-half of one per cent deformation after 54,000 strokes, whereas the best of conventional hard-surface floor materials had been broken up at 17,000 strokes. Somewhat higher priced than linoleum, the Koroseal flooring will be marketed principally in hotels, hospitals, theaters, airports, and food-processing industries.

Introduces Toilet Top Tray

A tray designed to serve as a handy place to put toiletries, and which fits on top of all sizes of toilet tanks, has been introduced by the Wooster Rubber Co., Wooster, Ohio. Known as the Rubbermaid Toilet Top Tray, the tray is made of synthetic rubber. It is said to be resistant to grease, heat and water. Its flexibility enables it to conform to the crown of the toilet tank and its ribbed bottom surface prevents it from slipping off the tank. An outer rim catches all liquids or powders which might be spilled. It is available in six colors—green, blue, black, yellow, peach and white.



Develop Geophysical Wire

A new geophysical wire which weighs less than the prewar wire used on seismographic equipment in oil explorations and is said to contain greater strength and flexibility has been developed by the U. S. Rubber Co. The new wire is made with a small diameter conductor insulated by a special dipping process. During the war this process was used in producing lightweight Army telephone wire which could be carried more easily by troops engaged in establishing communications at the front. In oil prospecting the new wire is used to pick up vibrations from the earth when a charge of dynamite is set off.

OBITUARIES

Howard W. Starkweather

Dr. Howard W. Starkweather, a member of the executive staff of the Jackson Laboratory of the Organic Chemicals Division of E. I. du Pont de Nemours & Co., died of a heart attack on May 18 at his home in Wilmington, Del. He was 55 years old.

Born in Carbondale, Penna., Dr. Starkweather was graduated from Bucknell University in 1911. After three years as an instructor at Phillips Exeter Academy, Exeter, N. H., he returned to Bucknell to take his master of science degree in 1915. Harvard University granted him the degree of master of arts the same year and later, in 1925, the degree of doctor of philosophy.

Dr. Starkweather was assistant professor of chemistry at Hobart College from 1916 to 1918, leaving his post there to enter the Jackson Laboratory. In 1919 he joined Brown University as an instructor. He was a fellow at Harvard in 1924 and 1925 and did research work there under the Milton Fund from 1925 to 1929, when he joined the staff of the Du Pont Experimental Station. He was transferred to the Jackson Laboratory in 1934 and became head of the polymerization division in 1935. He made numerous contributions to the scientific literature and held numerous patents.

A member of Alpha Chi Sigma, Dr. Starkweather was also active in the Wilmington Section of the American Chemical Society. He served as councillor for three terms. A widow, son and daughter survive.

Eberhard Faber

Eberhard Faber, chairman of the board of the Eberhard Faber Pencil Co., Brooklyn, N. Y., and president of the Eberhard Faber Rubber Co., Newark, N. J., died in his home at 820 Fifth Ave., New York City, on May 16, after a long illness. He was 87 years old.

Born in New York City in 1859, Mr. Eberhard attended the Hawkins School in Richmond County and entered the Columbia University School of Mines when he was 15 years old, completing his education in Europe. In 1879, at the age of 20, he took over the presidency of the pencil firm at his father's death, and remained active in its management until his own death. He founded the Eberhard Faber Rubber Co., manufacturers of erasers, rubber bands and other stationary items, in 1896. He was also a director of the Northern Insurance Co. and honorary chairman of the United States Trade Mark Association.

In his youth Mr. Faber was an athlete. He had been president of the Staten Island Boat Club, a charter and honorary life member of the Richmond County Country Club, and a senior member of the New York Athletic Club. He also held membership in the Metropolitan Club of New York, was president of the American Whist Club, and past president of the Tin Whistles Club of Pinehurst, N. C. A widow survives.

Charles E. Cummings

Charles E. Cummings, assistant secretary of Raybestos-Manhattan, Inc., Passaic, N. J., and one of the 52-year pioneers of the Manhattan Rubber Manufacturing Division, died on June 6 at the age of 79. Born in Brooklyn, N. Y., on June 27, 1867, Mr. Cummings first entered the rubber industry in 1881 when he became employed at the New York office of the New York Belting & Packing Co. He joined Manhattan Rubber as a bookkeeper in the New York office on April 16, 1894. Mr. Cummings was a member of the Royal Arcanum for more than 50 years and a representative on the Order's supreme national council. He was also a director and secretary of the Manhattan Securities Co. and a lifelong member of the First Methodist Church of Passaic.

William J. O'Brien

William J. O'Brien, rubber thread technologist and consultant, died at his home in West Haven, Conn., on April 9, at the age of 82. Born in Westchester, N. Y., Mr. O'Brien joined the Easthampton Rubber Thread Co., Easthampton, Mass., as an office boy in 1876 and rose to superintendent. He founded the O'Brien Rubber Thread & Webbing Co., in 1896. In 1911 he became associated with the B. F. Goodrich Co., working on the development of the floating and all-tape golf balls. He designed the plant layout of the first rubber thread plant to have a completely air conditioned mill room and thread finishing room for the Chatham Manufacturing Co., Portland, Conn., in 1921. He served with Chatham as factory manager until his retirement in 1931. A widow and son survive.

Robert D. Woolery

Robert D. Woolery, secretary-treasurer and general manager of the Polson Rubber Co., Garrettsville, Ohio, died on May 15 in Kent, Ohio, after an illness of some fifteen months. He was 53 years of age. Mr. Woolery, a native of Salina, Kansas, joined Polson Rubber about 30 years ago as a production worker.

St. John X-Ray Laboratory has announced the removal of all its facilities from Long Island City, N. Y., to its own building located at Califon, N. J.

Dielectric Measurements

Tables of measurements of dielectric constant and loss over a wide frequency range of polymers, waxes, liquids and other materials over a high frequency range are contained in a report which has been made available by the Department of Commerce. Included in the report is information on composition, availability and recommended applications. An index is arranged according to chemical composition, manufacturer and trade names. The tables for the report were compiled by researchers at the Massachusetts Institute of Technology during the war. Copies of the report, called PB-4658, may be obtained from the Office of the Publication Board, Department of Commerce, Washington 25, D. C., for $14 in photostat form or $2.50 in microfilm form. Another report, PB-4661, on the characteristics and specific properties of individual dielectric materials, may be obtained at the same address for $16 in photostat form or $2.50 in microfilm form.

Ascoli Heads Rubber Growers

Frank David Ascoli, director and technical adviser of Dunlop Malayan Estates, Ltd., and associated with the rubber growing activities of the Dunlop organization since 1926, was recently elected chairman of the Rubber Growers' Association (London), succeeding T. B. Barlow. Mr. Ascoli has been a member of the R.G.A. council since 1927 and served as vice-chairman last year. He has also been chairman of the council of the Institution of the Rubber Industry since 1930. During the war, he served with the British Ministry of Supply, as Deputy Controller of Rubber in 1941, as Controller in 1942, and as Director of Rubber from 1943 to 1945.

To Produce Toy Balloons

Ashland Rubber Products Co. is the name of a newly organized concern in Ashland, Ohio, which is engaged in the manufacture of toy balloons. The company is owned by E. H. Walters, C. A. Butts and Bert Morr. The latter was formerly associated with the Eagle Rubber Co. as superintendent of the dipping plant. It is expected that 600 gross of balloons will be produced daily once present plans for expansion are completed.

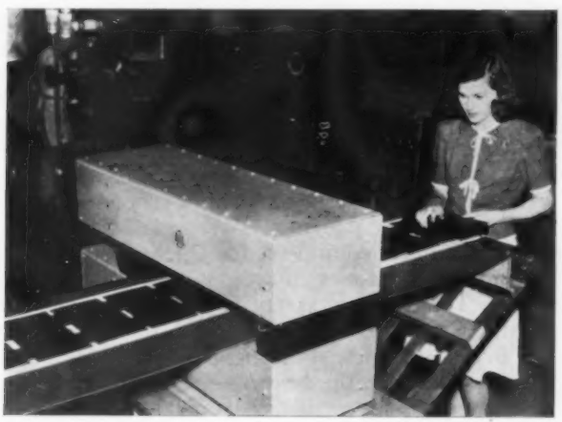
Plastic Wire Registers Issue

Plastic Wire & Cable Corp., Jewett City, Conn., has registered with the Securities and Exchange Commission 49,500 shares of common stock at $6 a share with no par value. Proceeds of the issue, expected to net approximately $236,000, will be used to carry inventories and accounts receivable, to pay Federal tax obligations when due, and to purchase additional machinery and equipment.

NEW EQUIPMENT

RCA Electronic Metal Detector

An electronic metal detector for application with rubber, plastics, textiles, lumber, paper, foods and other products, has been designed and introduced by the RCA Victor Division of the Radio Corporation of America, Camden, N. J. The reaction set up in the device when metal is present in materials being



inspected can be used to light a warning lamp, ring a bell, stop a continuous process, mark the contaminated object, or deflect it into a special channel or receptacle for rejects. Objects or materials can be passed through the inspection aperture on an endless conveyor belt or by means of a chute. The device will accommodate conveyor speeds up to 6,000 per minute without impairment of inspection efficiency. The completely self-contained unit is 43 inches long by 15 inches wide, with an over-all height of 20 inches plus the height of the aperture, which may vary from 4 to 12 inches to meet product requirements.

Unlike magnetic metal detectors, which will react only to magnetic metals such as iron and steel, the RCA device will detect any kind of metal or alloy, including iron, copper, brass, lead, aluminum, stainless steel, and others. Ultra-sensitive, it will react to minute as well as larger pieces of metal. Its discrimination can be adjusted to fit conditions for each installation. The reaction is independent of the depth to which the particle may be imbedded in the product being inspected.

In operation, materials passing through the inspection aperture are screened by a high-frequency electromagnetic field, which is generated by scientifically designed coils imbedded in plastic panels at the top and bottom of the aperture. High-frequency power is fed to the coils from a self-contained electronic oscillator, and the reaction caused when metal is present in the material being screened is detected and amplified by a sensitive electron tube amplifier. This amplifier triggers either a signaling device (lamp or bell) or an automatic marking or ejection mechanism, or a combination of these, whichever is desired.

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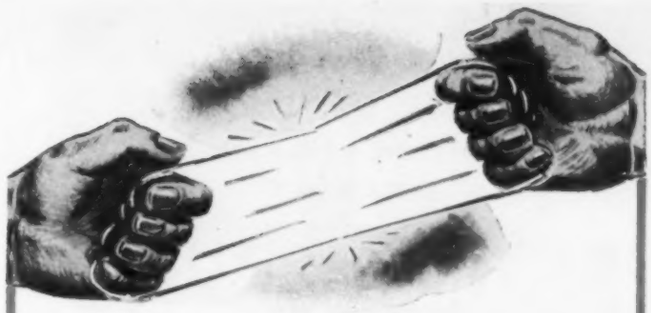

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Duplex Deluxe Chem-O-Feeder, a new chemical diaphragm type proportioning pump delivering chemical reagents in an almost continuous stream, has been released for civilian use by % Proportioneers, Inc., %, 66 Codding Street, Providence, R. I. It is designed for

the positive injection of one or two chemicals at predetermined and adjustable rates and is adapted for many uses including feeding chemicals for water sterilization. The feeding rate of each chemical is individually adjustable for coarse variations by changing the stroking rate through a two-step cone pulley and belt arrangement. For fine variations, a stroke length adjustment knob on top of the Chem-O-Feeder instantly varies the amount of solution fed per stroke. Transparent plastic reagent heads bare vital operating parts, such as diaphragms and check valves, to visual observation by the operator while the equipment is in operation. Also, each discharge stroke of the feeder is visible in sight feeder domes and any feeding irregularity may be detected. Moving parts inside the rugged unit case operate in an oil bath, resulting in long wearing life.

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FOR FURTHER DETAILS, SEE AD ON PAGE 246

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REVIEWS

BOOKS

Tire Wear and Cost on Selected Roadway Surfaces. (Bulletin No. 161 of the Iowa Engineering Experiment Station.) By R. A. Moyer and Glen L. Tesdall. Published by Iowa State College, Ames, Iowa. 6 x 9 in. 128 pp.

The factors which directly affect tire wear and cost, determined from the results of 450,000 miles of carefully controlled driving on gravel and bituminous surfaces and concrete pavements in Iowa, Kansas, Missouri, and Wyoming, are reported in this bulletin. The study is part of a general investigation of the effects of roadway surfaces on the costs of automobile operation, carried out from 1938 to 1942 in cooperation with the Public Roads Administration and requiring detailed observations with eight cars driven at speeds ranging from 25 to 65 mph.

The results show that tire wear is influenced directly by 15 factors, the most important being car speed, roadway surface, and driving and maintenance habits of the operator, and that 12 factors, most of which are avoidable, contribute directly to tire carcass failure. The average rate of tire wear observed on concrete pavements and bituminous surfaces indicates that, with due attention to tire maintenance, a life of 56,500 miles may be expected if speed does not exceed 35 mph., whereas at 65 mph. the life expectancy is only 18,700 miles. In the road trials the average life of ten tires operated on concrete pavements was 36,650 miles; that of twenty tires on gravel surfaces was 23,160 miles, many of these tires being retired because of carcass failures before the treads were worn smooth. Also, there were 98 punctures in 132,000 miles of travel on gravel surfaces, as compared to a single puncture in an equal distance on concrete pavements, and one puncture in 72,000 miles on bituminous surfaces.

The records show that tire wear on curves at speeds which cause the tires to "scream" is more than ten times the wear at speeds which do not result in sidewise skidding; that the tire costs in "stop-and-go" driving on concrete pavements are slightly more than three times the corresponding costs for average country driving; and that many thousands of car-miles of tire use are lost through avoidable carcass failures.

•

Abstracts on Synthetic Rubber (in Two Parts): Part III—Articles; Part IV—Patents. By Muriel E. Whalley. Issued by the National Research Council of Canada, Ottawa, Canada. 8½ x 11 in. each. Part III, 435 pp.; Part IV, 300 pp. $2.00 for each part.

These publications are a continuation of former work by the National Research Council of Canada on "Abstracts on Synthetic Rubber," Parts I and II of which were issued in 1943 (see RUBBER AGE, January, 1944, p. 366). As in the previous reports, the abstracts deal with the processes of manufacture of synthetic rubbers and related subjects, as well as the properties of the various synthetics and on work in connection with the improvement of such properties. Part III, which comprises 910 abstracts of articles arranged in alphabetical order by authors with a subject index, is a continuation of Part I, while Part IV, which consists of 501 abstracts of patents arranged in chronological order with a subject index, an index of patentees, and a numerical patent index arranged according to countries, is a continuation of Part II. In addition, Part IV contains a collection of 116 abstracts of patents seized by the Alien Property Custodian in the United States. Like the previous reports, the abstracts furnished are comprehensive. The source of each article is given in the case of articles, while the indexes are set off by the use of different colored paper, making them easy to locate and use.

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Models DH, J, L-1, L-2, L-7, Q, and U: oil gear box periodically with a small quantity of SAE 30. Oil holes are provided at all necessary points. The friction side of the clutch must not be lubricated. If there is slippage, the pulling clamp will not return properly to the starting position. Remedy: wash the clutch face with gasoline or similar grease solvent. The enclosed gear attachment on the right side of the gear box should be inspected periodically and be kept packed with good grade gear lubricant.

Models X, X-2, X-3, X-4, L-3, L-4, L-5, and L-6: Keep gear box filled to proper level with SAE 40. If so equipped, check the multiple-speed box periodically and oil with SAE 30 as required.

Models L-3, L-4, L-5, and L-6 have a dash pot to control the action of the pulling clamp. A small quantity of Neatsfoot Oil should be poured through the tube of this dash pot about every six months.

IP-2 Tensilgraph and IP-2 Serigraph: oil gear box with a small quantity of SAE 10 regularly. Do not use oil excessively on the sliding shaft in the box.

IP-4 Tensilgraph: the gear box requires little attention; add SAE 50 on the worm reduction unit at infrequent intervals as necessary and oil the adjacent moving parts with a few drops of SAE 30. IP-4 Serigraph: maintain proper level in the gear box by adding SAE 20 periodically.

IP-2 and X-5 motors have gear reduction units, to be lubricated every six months with good quality worm gear lubricant.

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A. S. T. M. Standards on Rubber Products; 1946. Published by the American Society for Testing Materials, 1916 Race St., Philadelphia 3, Penna. 6 x 9 in. 560 pp. $3.25.

Prepared by A.S.T.M. Committee D-11 on Rubber, this latest edition of the special compilation of standards on rubber and rubber-like materials is considerably larger than the previous one. It brings together in convenient form over 75 specifications and tests covering natural and synthetic rubbers.

Almost 200 pages are devoted to general methods—chemical analysis, identification and quantitative analysis of synthetic elastomers, sample preparation, tension testing, accelerated aging by the oxygen pressure and the oven methods, heat aging by the test tube method, air pressure heat test, resistance to light checking and cracking and resistance to accelerated light aging of rubber compounds, cure adhesion, abrasion, tear, compression set, conditioning, changes in properties of rubber and rubber-like materials in liquids, etc.

In the section on electrical tests, methods cover dielectric strength at commercial power frequencies, power factor and dielectric constant, and insulation resistance. The latest specifications for rubber and synthetic rubber compounds for automotive and aeronautical applications are included in another section. Thirteen specifications cover insulated wire and cable and other specifications and methods covering hose, belting, gloves, matting, tape, etc., are also given.

Miscellaneous tests include viscosity and total solids content of rubber cements, latices of natural and synthetic rubbers, asphalt composition of battery containers, rubber cups, cotton goods, cellular rubber products, adhesives, etc. There are four specifications and three methods covering non-rigid plastics, in addition to a section on nomenclature and definitions.

•

Modern Plastics. By Harry Barron. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. 5½ x 8½ in. 680 pp. $7.50.

Designed to provide an adequate technical background to plastics, this volume completes a trilogy planned by the author several years ago based on the belief that there is no longer a sharp division between rubber, synthetic rubbers and plastics. The two previous books were "Modern Rubber Chemistry" and "Modern Synthetic Rubbers." The book does not attempt to cover the gamut of "plastics" but rather concentrates on information of practical value. The author states in his preface, "It is time to consider materials off the main-stream of current plastic development when you know something about phenol-formaldehyde, polyvinyl chloride, etc." The book is divided into six sections, as follows: (1) Introductory; (2) Thermo-setting Resins and Their Plastics; (3) Cellulose Plastics; (4) Vinyl Plastics; (5) Other Leading Plastics; (6) Some Important Aspects of Plastics. In all, there are 31 chapters. Author and subject indexes are included.

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BOOKLETS, CATALOGS, Etc.

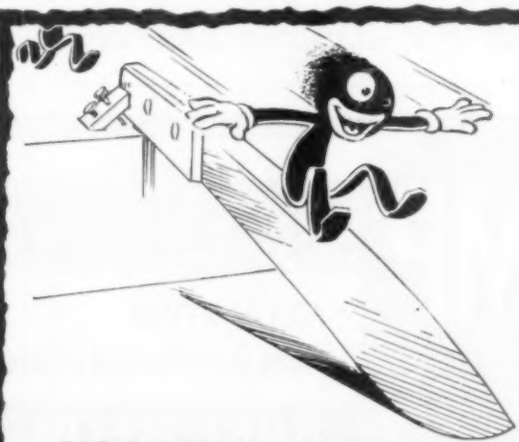
Injection Molding and High Temperature Press Curing of Natural and Synthetic Rubbers. R. T. Vanderbilt Co., Inc., 230 Park Ave., New York 17, N. Y. 8½ x 11¼ in. 48 pp.

Based on mechanical improvements in equipment for and the adoption of new heating methods by the rubber manufacturing industry there is a growing trend toward higher curing temperatures and shorter molding cycles. The problems and procedures involved in injection molding and high temperature press curing of natural and synthetic rubbers are outlined in this technical report. In addition the report evaluates a number of Vanderbilt accelerators and other compounding materials in various rubbers, including GR-S, neoprene, Hycar OR-15, in addition to natural rubber and whole tire reclaim, cured at 400° F. The findings reported are those determined to date on high temperature press curing in the Vanderbilt Laboratory and at the Monroe Auto Equipment Co. where an injection molding press was made available for the experiments. To provide the information contained in the report, a battery of quick closing hydraulic presses were installed in the Vanderbilt Laboratory. These presses were equipped with electrically-heated platens having individual temperature controls capable of assuring uniform vulcanizing temperatures up to 550° F. The report is the first of its kind to be made available to the rubber field.

•

Naugatuck Rubber Chemicals. Naugatuck Chemical Division of U. S. Rubber Co., Rockefeller Center, New York 20, N. Y. 6¼ x 9½ in. 140 pp.

This book is a quick and ready reference to information on the characteristics and uses of rubber chemicals and compounding ingredients offered by Naugatuck Chemical. The data given, while concise, is sufficiently complete in each instance to enable the compounder to make a quick and accurate appraisal of each product. Products are arranged in the main groups of accelerators, antioxidants, activators and special products. The accelerators have been still further sub-divided on the basis of chemical structure (thiazoles, thiurams, dithiocarbamates, aldehydeamines, and xanthates. In addition, brief discussions and explanatory matter on accelerators and vulcanization, organic accelerators, activators, antioxidants, and special products are included. Typical applications of the company's materials and amounts to use are also shown both for natural and synthetic rubber.



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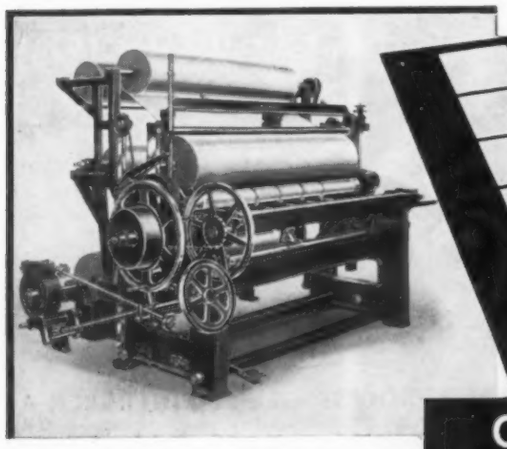

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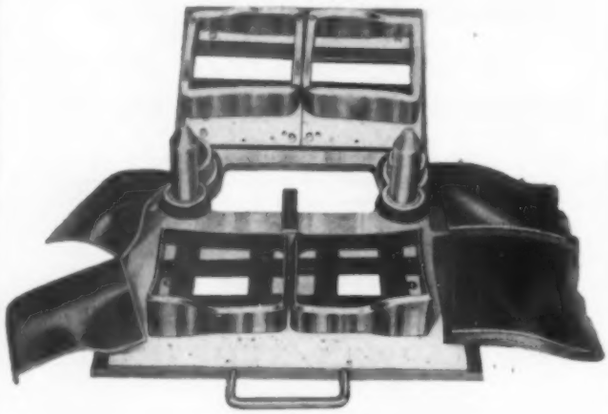

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They Were Dependable—Airship Operation in World War II. Ship's Service Department, United States Naval Air Station, Lakehurst, N. J. 7¾ x 10½ in. 60 pp.

A graphic account of the role of the airship during the war is presented in this booklet. Illustrations and photographs are employed effectively to describe the growth of the airship force from December 7, 1941, when there was not a single Fleet airship unit in existence, to the time when airship squadrons and fleets were located on bases throughout the world. The functions of the airship in search operations, observation, photography, recovery of experimental and training torpedoes, rescue operations, mine operations and as a member of the anti-submarine team are also graphically presented.

•

Statex B for Natural Rubber Carcasses. (Bulletin No. 134). Binney & Smith Co., 41 East 42nd St., New York 17, N. Y. 8½ x 11 in. 2 pp.

Natural rubber carcasses containing Statex B, the furnace carbon which was developed and standardized by the Columbian Carbon Co. during the war, are described in this technical bulletin. Dynamic and physical properties of two typical compounds are shown. The first compound, or control, is a zinc oxide stock. In the second, the amount of zinc oxide necessary for curing is retained and the balance substituted with an equal amount of Statex B. Data were selected at equal states of cure, in order to make sure that the values shown are strictly comparable.

•

Seminex Carbon Black. Carbon Black Division, Jefferson Lake Sulphur Co., Inc., Houston, Texas. 8½ x 11 in.

Some interesting technical information on Seminex, a new semi-reinforcing furnace carbon black, is contained in this report. Graphs indicating elongation and heat build-up characteristics of the new black are included, as is a table giving typical physical results obtained with GR-S compounds containing 50, 75 and 100 parts of Seminex to 100 parts of GR-S. A microphotograph indicating the particle size of the black is also reproduced in the booklet.

•

Meyercord Decalcomania Decorations. Meyercord Co., 5323 West Lake St., Chicago 44, Ill. 9x11½ in. 26 pp.

Hundreds of decalcomania transfers for the decoration of manufacturers' products are illustrated in this catalog. Although the actual decalcomanias are executed in gay colors or pastel tones, the designs shown are illustrated in black and white. The catalog is divided into the following four sections: (1) Juvenile Decorations; (2) Floral Decorations; (3) Houseware Decorations; and (4) Novelty Decorations.

FOR EASY PROCESSING USE PHILBLACK A

FOR FURTHER DETAILS, SEE AD ON PAGE 246

New Stock Cooling Rack

THIS New Rack offers a convenient method for storing materials that require cooling or air drying.

- Rack can be either stationary or mounted on casters.
- Trays have perforated metal surface and can be spaced to suit.
- Standard Rack has eighteen trays 36" x 36" spaced 2⅝" apart.

SPADONE MACHINE COMPANY

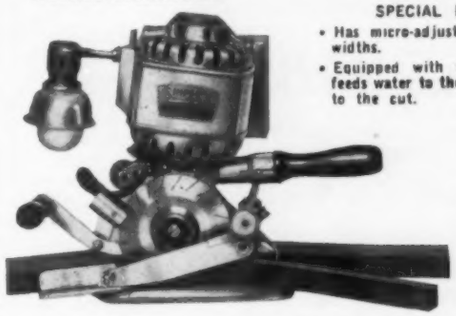
10 East 43rd St. New York 17, N. Y.

SIMPLEX
REG. TRADE MARK

RUBBER STRIP CUTTER

PATENTED

A PORTABLE machine capable of stripping slab rubber up to 1" thick at the rate of 20,000 feet in 8 hours. Any width desired.



SPECIAL FEATURES

- Has micro-adjustment for accurate widths.
- Equipped with water tank which feeds water to the slotted knife and to the cut.
- Has repulsion-induction motor which carries any overloads.
- Automatic sharpener device keeps knife keen and sharp.
- Has base with rollers and is very easy to handle.

Cuts within 1/64 inch to 1/100 inch tolerance depending on grades of rubber. Cuts a slab down to the last shaving. Cuts all grades of rubber including pure gum, sponge, etc. Cuts squarely—no rejects.

Now in use by many leading Rubber Manufacturers & Jobbers

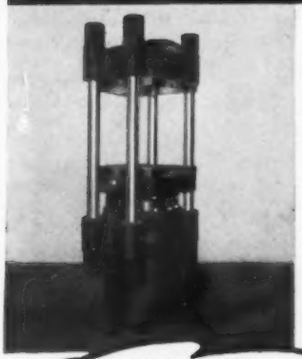
Simplex Cloth Cutting Machine Co., Inc.

Manufacturers of a Complete Line of Cloth Cutting Machinery

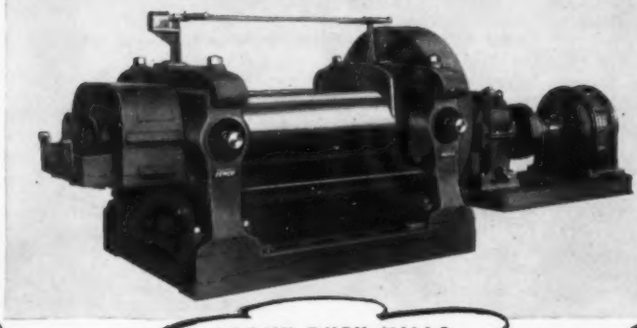
270 West 39th St. New York 18, N. Y.

Cable Address—SIMPLEX, N. Y. *Phone*—WIsconsin 7-5547

RUBBER & PLASTICS PROCESSING MACHINERY



PRESSES



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LABORATORY MILLS

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MILLS • PRESSES • TUBERS
EXTRUDERS • STRAINERS
WASHERS • CRACKERS
CALENDERS • REFINERS

Three outstanding features are found in EEMCO Rubber and Plastics Processing Machinery. First, Correct Design; second, Sturdy Dependability; third, Built for Heavy Duty and Long Life with minimum repairs. Mills, Crackers, Refiners and Washers are furnished as single units, or for operation "in line" of two or more.

EEMCO Presses are made from 12" x 12" for Laboratory use up to sizes to meet all requirements. The New EEMCO Laboratory Mill (illustrated) is a fully enclosed, self-contained unit with variable speed drive. Streamlined, it is ideal for Laboratory and Small Production. Bulletins sent on request. *Write today for quotations & delivery.*

EEMCO ERIE ENGINE & MFG. CO.

953 EAST 12th ST., ERIE, PENNA.

MARKETS

Rubber – Crude, Reclaimed and Scrap – Cotton – Ducks – Tire Fabrics – Sheetings

NEW YORK JUNE 12, 1946

Natural Rubber

NEGOTIATIONS concerning a new price to be paid for natural rubber by the United States are being held in London as this is being written. Agreements providing for the payment of 20¼ cents per pound, made with the British, Dutch and French, expire on June 30. Although little has been heard from planters in the Netherlands Indies or French Indo China concerning prices, there has been considerable agitation on the part of Malayan planters for higher prices ever since the current agreements were signed. This agitation has even reached into Parliament.

Malayan planters have been urging a price of about 35 cents a pound for the so-called short term, pointing out that rehabilitation costs are high. They are also considerably irked over the fact that planters in Ceylon have been securing over 30 cents a pound for their rubber during the wartime period and continue to receive this figure today. There is little doubt that the United States will agree to a higher price per pound than the current 20½ cents, but the probability is that it will not exceed 25 cents. It is also probable that any new price agreement will be of relatively short duration.

Repercussions of efforts sponsored by the United States to secure rubber from Brazil during the drastic emergency are being heard in that country. According to word from Rio de Janeiro, only 3,000 tappers of the 50,000-odd sent into the jungles in the past few years have been returned to their homes. Charges have been made that those who did not lose their lives in the rubber-producing areas are having to "beg" their way home. The existence of this "rubber army" has become a burning political question.

Prices shown below are ceilings set by the Office of Rubber Reserve, Reconstruction Finance Corporation:

	C	N-C
Plantations—		
Ribbed Smoked Sheets, 1X...	22½	40
Thick Pale Latex Crepe, 1X..	22½	40
Thin Pale Latex Crepe, 1X..	22½	40
Thick Brown Crepe, 1X.....	21⅜	38⅞
Thin Brown Crepe, 1X.....	21⅜	38⅞
Thick Remilled Blankets, #1..	21⅜	38⅞
Rolled Brown or Flat Bark..	18	35½
Smoked Blankets, #1.....	21⅛	38⅝
Claro Brand 1XRSS.....	22¼	40
Sole Crepe Trimmings.....	22	39⅛
Sole Crepe	22¼	40
Wild—		
Uncut Fines, Crude.....	15	29
Cut Fines, Crude.....	15½	29¾
Cut Fines, Washed & Dried..	22½	40
Upriver Coarse, Crude.....	12⅜	26⅛
Upriver Coarse, Washed & Dried	20¼	37¼
Caucho Ball, Crude	11⅜	24¾
Caucho Ball, Washed & Dried	19½	37
Guayule—		
Carload Lots	17⅛	31
Less than Carload Lots	18	31⅛
Balata—		
Surinam Sheet	42½	42½
Manaos Block	38¾	38¾
Colombian Block	38¾	38¾
Peruvian Prime	38¾	38¾
Chicken Wire	23¼	23¼
Latex—		
Normal, Tank Car Lots	26	43½
Creamed, Tank Car Lots	26¾	44¼
Centrifuged, Tank Car Lots..	27¾	45¼
Heat-Concentrated, Carload Drums	29½	47

C for Civilian Use; N-C for Non-Civilian Use.

Scrap Rubber

Little improvement in the scrap rubber market has been noted since our last report, the market continuing quite dull with little demand for tire parts. The only scrap which seems in good demand at the moment is tube scrap. Faced with the usual summer lull, scrap dealers anticipate no drastic change in the situation for several months to come. OPA established ceilings on scrap solid tires from tanks on May 22. The ceilings, ranging from $22.50 to $36.00 a ton, depending on the consuming center where the scrap is delivered, are the same as those previously established for scrap solid motor tires. Quantities of these tank tires are being offered as the Army proceeds with its liquidation program. Prices shown below are ceilings on typical grades of scrap:

(Prices to Consumers, Delivered Akron)

Mixed passenger tires	ton	$20.00
Beadless truck tires	ton	26.00
Mixed truck tires	ton	20.00
Beadless passenger tires	ton	26.00
No. 1 passenger peelings	ton	52.25
No. 1 truck peelings	ton	52.25
No. 2 passenger tubes	lb.	.07¾
Red passenger tubes	lb.	.07½
Black passenger tubes	lb.	.06¾
Mixed passenger tubes	lb.	.06¾
No. 2 truck tubes	lb.	.07¾
Red truck tubes	lb.	.07¾
Black truck tubes	lb.	.06½
Buffings	ton	35.00
Bicycle tires	ton	15.00
Air bags and water bags	ton	15.00
Boots and shoes	ton	33.00

Tire Fabrics

Although some relief in the tight tire fabric situation is reported as a result of the M-317A distribution order which established rubber manufacturers as one of the essential fields under the industrial set-asides, total yardages made available are still totally inadequate. Contributing to the difficulty is the fact that tire manufacture is reaching all-time record proportions, far above previous peak production. The 1946 production schedule for passenger car tires is now set at 67,150,805 units, an increase of 3,150,000 units over the previous schedule. According to a survey of February receipts against demand for sheetings the tire field secured only 4% of its requirements for such material in that month. Prices shown below are ceilings on typical grades of cotton tire cord:

Standard, Peeler, 12/4/2	lb.	.5276
Standard, Peeler, 14/4/2	lb.	.5381
Standard, Peeler, 16/4/3	lb.	.5486
Extra Staple, Peeler, 12/4/2	lb.	.6011
Extra Staple, Peeler, 14/4/2	lb.	.6116
Extra Staple, Peeler, 16/4/3	lb.	.6221

Note: Under OPA regulations mills in Band A add 7.98% to the above prices; mills in Band B add 4.55%.

Sheetings

48x40	36	in.	5.50	lb.	@ 8.272
40x40	36	in.	6.15	lb.	@ 7.398
40x36	36	in.	6.50	lb.	@ 7.000
48x48	40	in.	2.50	lb.	@17.200
48x48	40	in.	2.85	lb.	@15.087
56x60	40	in.	3.60	lb.	@12.638
48x44	40	in.	3.75	lb.	@11.733

Note: Prices shown above are ceiling prices set by order of the O.P.A.

Cotton

The price of middling uplands on the Cotton Exchange has swung in the wide range of 207 points since our last report (May 16), high for the period being 29.82 on June 12 and low 27.75 on May 17. The average price for middling uplands for the month of May was 28.17, based on 26 trading days. The downward trend in prices, which began during the first week in May because of the coal and railroad strikes, was reversed during the last week in May after those two strikes were settled. In early June prices moved upward rapidly to 22-year high levels, based principally on the approval by the Senate Banking and Currency Committee of a price control bill that drastically curtails the powers of the Office of Price Administration. Also contributing to the rapid rise of prices in June was the continuing unfavorable weather in the Cotton Belt, expectations of an increase in domestic mill consumption, and the steady improvement in the supply and distribution outlook for American cotton. Reports that both houses of Congress would approve sharply modified price control legislation are expected to maintain prices at current or even higher levels. Quotations for middling uplands on the Exchange follow:

	May 16	June 12		
	Close	High	Low	Close
October	27.50	29.32	28.98	29.28
December	27.59	29.49	29.11	29.42
March	....	29.54	29.17	29.47

Reclaimed Rubber

No slackening of any kind in the demand for reclaimed rubber has been evident in the last several weeks, despite the continued shortages which harass tire and other rubber manufacturers and the usual summer vacation and inventory shut-downs. Manufacturers' ceiling prices for reclaim were increased by one-half cent a pound by OPA on May 31. The increase was provided to take care of recent increases in wages and material costs. Ceilings were also similarly raised for the service of processing scrap rubber into reclaim. The increases were covered in Amendment No. 7 to R.P.S. 56 and Amendment No. 2 to Supplementary Service Regulations 35 to R.M.P.R. 165. The prices shown below, which are ceilings on typical grades of reclaim, reflect the approved increase:

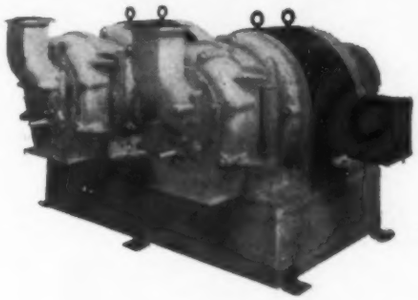
Shoe				
Unwashed	lb.	.08	@	.08¼
Tube				
Black Tube	lb.	.12¼	@	.12½
Red Tube	lb.	.13	@	.13¼
Tires				
Black (acid process)	lb.	.08½	@	.08¾
Black, selected tires	lb.	.07½	@	.07¾
Truck, Heavy Gravity	lb.	.09½	@	.09¾
Miscellaneous				
Mechanical blends	lb.	.05½	@	.06¼
White	lb.	.14	@	.14¾

Ducks

Enameling (single filling)	lb.	@	.44¼
Belting and Hose	lb.	@	.39
Single filling, A grade	lb.	@	.19¼
Double filling, A grade	lb.	@	.20¼

ROBINSON
PROCESSING UNIQUE EQUIPMENT

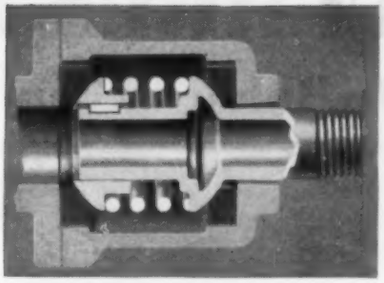
FRIGIDISC GRINDERS



This exceptionally sturdy, ruggedly constructed mill grinds material to finished size. Built-in cooling device. Cooling-liquid is continuously circulated against the back of each grinder disc. Robinson Processing Equipment of every type . . . Crushers, Grinders, Sifters, Attrition Mills . . . is designed to your requirements by experienced engineers. Literature available. Inquiries invited!

ROBINSON MANUFACTURING CO.
Plant: Muncy, Pa.
SALES REPRESENTATIVE
MERCER-ROBINSON COMPANY, INC.
30 CHURCH ST., NEW YORK 7, N.Y.

4 good reasons ...why JOHNSON rotary JOINTS



Speed Up Production and Cut Down Maintenance

1. Completely Packless—positive seal
2. Self-Oiling—no lubrication required
3. Self-Adjusting—joint is pressure sealed
4. Self-Aligning—joint absorbs all misalignment

Yes, Johnson Rotary Pressure Joints end all the troubles of the old style stuffing boxes and steam fits. In addition, they provide a simple way to install more efficient methods of syphon drainage. And—very important—is the fact that Johnson Joints pay their own way out of savings in maintenance alone.

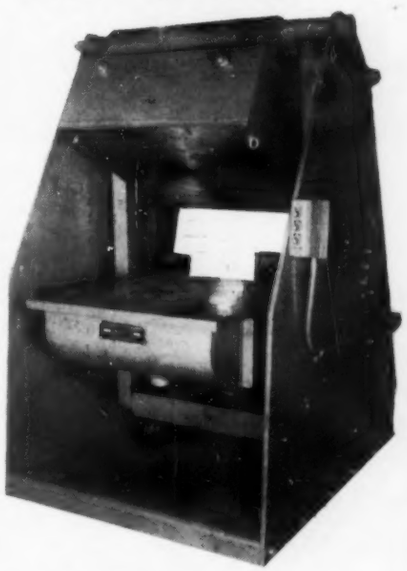
Write for complete information.

The Johnson Corporation
865 WOOD STREET THREE RIVERS, MICHIGAN

STANMOCO OIL HYDRAULIC VULCANIZING PRESSES

For mechanical rubber and plastic articles. Combination oil hydraulic and toggles with platen pressure of 200 tons. Platens 34" x 34" with daylight opening 14½". May be adjusted for slight variation of mold thickness. Simple in construction and easy to lubricate and maintain. Easily controlled.

Write for complete details.



←CLOSED OPEN→

The Akron Standard Mold Co.
Akron "The Established Measure of Value" Ohio

CURRENT MARKET PRICES

Of Rubber Chemicals and Compounding Ingredients

JUNE 12, 1946

Prices are, in general, f.o.b. works.
Range of prices indicates grade or quantity variations.
All trade or brand names are set off in quotation marks.
Abbreviations: bbls., barrels; c.l., carlot; l.c.l., less than carlot; dlvd., delivered; t.c., tank cars; min., minimum; dms., drums; cyl., cylinder.
[a] East of Mississippi.

—The arrangement of this section follows closely the Chemical Section of the 1945 RUBBER RED BOOK to which readers are referred to determine the classification of any material or brand name.
—Although suppliers of every material were contacted for price information, only those materials are listed for which quotations have been furnished us. The quotations are not guaranteed and prospective purchasers should contact suppliers for confirmation before placing orders. Suppliers are requested to send us regularly current prices on all of their materials used in the rubber industry.
—All requests for information or listings should be sent to Market Editor, RUBBER AGE, 250 West 57th St., New York 19, N. Y.

ACCELERATORS

"A-1"	lb.	.28	.33
"A-10"	lb.	.36	.42
"A-19"	lb.	.52	.58
"A-77"	lb.	.42	.55
"A-100"	lb.	.42	.55
"Accelerator No. 8" (dlvd.)	lb.	.63	.65
"Accelerator No. 49"	lb.	.40	.42
"Accelerator No. 89" (dlvd.)	lb.	—	1.20
"Accelerator No. 122" (dlvd.)	lb.	—	1.30
"Accelerator No. 552" (dlvd.)	lb.	—	1.63
"Accelerator No. 808" (dlvd.)	lb.	.59	.61
"Accelerator No. 833" (dlvd.)	lb.	1.13	1.15
"Acrin"	lb.	—	.65
"Advan"	lb.	.52	.55
"Altax"	lb.	.39	.41
"Arazate"	lb.	—	1.53
"Beutene"	lb.	.59	.61
"B-J-F"	lb.	.34	.36
"Bunac K-17"	lb.	.17	.19
"Butasan"	lb.	—	1.10
"Butazate"	lb.	—	1.10
"Butyl Eight"	lb.	.97	.99
"Captax"	lb.	.34	.36
"C-P-B"	lb.	—	1.95
"Cumate"	lb.	—	1.60
"Cuprax"	lb.	.60	.62
"Dibenzo G-M-F"	lb.	—	1.50
"Diesterex-N"	lb.	.50	.52
Diorthotolylguanidine (dlvd.)	lb.	.44	.46
Diphenylguanidine (dlvd.)	lb.	.35	.41
"El-Sixty"	lb.	.36	.43
"Ethasan"	lb.	—	1.10
"Ethazate"	lb.	—	1.10
"Ethyl Tuex"	lb.	—	1.25
Formaniline (dlvd.)	lb.	.36	.37
"G-M-F"	lb.	—	1.95
"Goodrite Erie"	lb.	.60	.62
"Guantal"	lb.	.39	.48
"Hepteen"	lb.	.34	.35
"Base"	lb.	1.25	1.30
"Ledate"	lb.	—	1.20
Mercaptobenzothiazole	lb.	.34	.36
Mercaptobenzothiazyl Disulfide	lb.	.39	.41
"Methasan"	lb.	—	1.20
"Methazate"	lb.	—	1.20
"Monex"	lb.	—	1.25
"Mono-Thiurad"	lb.	—	1.25
"Morfex 33"	lb.	.60	.62
"2-MT" (dlvd.)	lb.	.58	.60
"Namate"	lb.	—	1.00
"Novac"	lb.	—	1.40
"A-13"	lb.	.65	.67
"O-X-A-F"	lb.	.38	.40
"Pentex"	lb.	.74	.77
"Flour"	lb.	.12¾	.12¾
"Phenex" (tons)	lb.	—	.49
"Pipazate"	lb.	—	1.53
"Pip-Pip"	lb.	—	1.63
"R-2 Crystals"	lb.	—	1.55
"Rotax"	lb.	.44	.46
"Safex"	lb.	1.15	1.20
"Santocure"	lb.	.60	.67
"Selazate"	lb.	—	1.60
"Selenac" (Ethyl, Methyl)	lb.	—	1.60
"Setsit-5"	lb.	.70	1.00
"SPDX-G" (tons)	lb.	—	.53
"Tellurac, Ethyl"	lb.	—	1.60
"Tepidone" (dlvd.)	lb.	—	.63
"Tetrone" (dlvd.)	lb.	—	1.25
"A" (dlvd.)	lb.	—	1.85
Thiocarbanilide (dlvd.)	lb.	—	.28
"Thiofide"	lb.	.39	.46
"Thionex" (dlvd.)	lb.	—	1.25
"Thiotax"	lb.	.34	.41
"Thiurad"	lb.	—	1.25
"Thiuram E" (and "M") (dlvd.)	lb.	—	1.25
"Trimene"	lb.	.54	.56
"Base"	lb.	1.03	1.06
Triphenylguanidine (dlvd.)	lb.	—	.45
"Tuads" (Ethyl, Methyl)	lb.	—	1.25
"Tuex"	lb.	—	1.25
"Ulto" (tons)	lb.	—	.99
"L"	lb.	—	1.04
"Ureka"	lb.	.50	.57
"Blend B"	lb.	.50	.57
"C"	lb.	.48	.55
"Vulcanex" (dlvd.)	lb.	.42	.43
"Z-B-X"	lb.	—	2.45
"Zenite" (dlvd.)	lb.	.37	.39
"A" (dlvd.)	lb.	.42	.44
"B" (dlvd.)	lb.	.39	.41
"Zimate" ("Butyl," "Ethyl")	lb.	—	1.10
"Zimate, Methyl"	lb.	—	1.20

ACTIVATORS

Blue Lead, Sublimed (dlvd.)	lb.	.07¼	.07½
Fish Oil, Hydrogenated, Fatty Acid			
"Hyfac S-52"	lb.	.14⅞	.15⅜[a]
"Stearex Beads" (dlvd.)	lb.	.14⅞	.15⅞
Lime, Hydrated			
"Arrowhead"	ton	16.00	19.50
"Sierra"	ton	16.00	19.50
Litharge			
"Eagle" (dlvd.)	lb.	.08	.09
"FBS" (dlvd.)	lb.	.08	.09¼
Magnesium Oxide, Light			
"Baker's" (Neoprene Grade)	lb.	—	.25
"K & M"	lb.	—	.25
"Michigan No. 30"	lb.	—	.22½
"Michigan No. 40"	lb.	—	.25
"Witco Extra Light"	lb.	.25	.27
Magnesium Oxide, Heavy			
"Michigan No. 15"	lb.	.05	.05½
"Permanente"	lb.	.05	.06½
Oleic Acid (dlvd.)	lb.	.12½	.14¼
"Elaine O-18"	lb.	.12½	.13¾[a]
Palm Oil Fatty Acid (c.l.)	lb.	—	.11
Potassium Oleate (drums)	lb.	—	.29½
Red Lead			
"Eagle" (dlvd.)	lb.	.09	.10
"No. 2 RM" (dlvd.)	lb.	.09½	.11¼
Sodium Laurate (drums)	lb.	—	.19
Sodium Oleate—Powder (drums)	lb.	—	.35
Paste (drums)	lb.	—	.20
Sodium Stearate—Powder (drums)	lb.	—	.35
USP Grade (drums)	lb.	—	.37
Stearic Acid, Single Pressed			
"S-24"	lb.	.15⅛	.15⅞[a]
"Stearex B" (dlvd.)	lb.	.15⅛	.16⅛
Stearic Acid, Double Pressed			
"Alba" (dlvd.)	lb.	.19⅝	.20⅝
"S-2-A" (dlvd.)	lb.	.16⅞	.17⅜
"S-2-B" (dlvd.)	lb.	.16⅜	.17⅜
White Lead Carbonate (dlvd.)	lb.	.08¼	.08½
Zinc Laurate (c.l.)	lb.	—	.29
"Laurex"	lb.	.14¼	.15¼
Zinc Stearate	lb.	.29	.31

Unclassified Activators

"Activex"	lb.	.20	.22
"Actoflux 1-S"	lb.	.52	.62
"3-S"	lb.	.58	.64
"Aero Ac 50"	lb.	.46	.52
"165"	lb.	.43	.45
"Barak" (dlvd.)	lb.	—	.50
"D-B-A"	lb.	—	1.95
"Delac J"	lb.	.50	.55
"P"	lb.	.39	.43
"Dibutylamine No. 117" (l.c.l., dms.)	lb.	—	.69
"Hydrex" (c.l., dlvd.)	lb.	—	.14⅞
"Hydrofol Acid No. 51" (dlvd.)	lb.	.1487	.1587
"Palmalene" (drums)	lb.	—	.15
"Polyac" (dlvd.)	lb.	—	1.25
"Ridacto" (drums)	lb.	—	.20
"SL-20" (min. 10 drums)	lb.	—	.1089
"Snodotte" (dlvd.)	lb.	.1537	.1637
"SOAC" (min. 10 dms.)	cwt.	—	8.00
"Stearite"	cwt.	14.87	15.87
"Triamylamine No. 180" (l.c.l., drums)	lb.	—	1.01

ANTI-COAGULANTS

Anhydrous Ammonia (l.c.l.)	lb.	.02½	.02¾
"National" (cyl.)	lb.	.13	.17
"M.B.M." (l.c.l.)	lb.	—	.35

ANTI-FOAMING AGENTS

"Aero Anti Foam H"	lb.	—	.12
"Regular"	lb.	—	.08½

ANTI-OXIDANTS

"Agerite Alba"	lb.	1.95	2.05
"Gel"	lb.	.52	.54
"Hipar"	lb.	.61	.63
"HP"	lb.	.53	.55
"Powder"	lb.	.40	.42
"Resin"	lb.	.43	.45
"Resin D"	lb.	.40	.42
"Stalite"	lb.	.40	.42
"White"	lb.	1.23	1.33
"Akroflex C" (dlvd.)	lb.	.53	.55
"Albasan"	lb.	.69	.71
"Aminox"	lb.	.40	.42
"Antox" (dlvd.)	lb.	.54	.56
"Aranox"	lb.	—	1.95
Benzoquinone	lb.	1.50	1.75
"Betanox"	lb.	.43	.45
"B-L-E"	lb.	.40	.42
"Powder"	lb.	.61	.63
"B-X-A"	lb.	.43	.45
Carvacrol	lb.	—	.80
Chlorcarvacrol	lb.	—	2.00
"Flectol H"	lb.	.40	.47
"Flexamine"	lb.	.53	.55
Gallic Acid, Tech.	lb.	1.10	1.15
USP or NF	lb.	1.27	1.30
Hydroquinone	lb.	.90	.94
Monomethylparaminophenol sulfate	lb.	2.40	2.90
"Neozone Standard" (dlvd.)	lb.	.61	.63
"A" (dlvd.)	lb.	.40	.42
"C" (dlvd.)	lb.	.43	.45
"D" (dlvd.)	lb.	.40	.42
"D Distilled" (dlvd.)	lb.	.45	.47
"Oxynone"	lb.	.77	.90
"Parazone" (dlvd.)	lb.	—	.68
"Perflectol"	lb.	.53	.60
"Permalux" (dlvd.)	lb.	1.18	1.20
Pyrogallic Acid, Resublimed	lb.	2.60	2.65
USP Crystals	lb.	2.10	2.15
Resorcin, Tech. (dlvd.)	lb.	—	.64
"Santoflex B"	lb.	.40	.47
"BX"	lb.	.54	.61
"Santovar O"	lb.	1.15	1.40
"Santowhite"	lb.	1.23	1.38
"S.C.R." (tons)	lb.	—	.32
"Solux" (dlvd.)	lb.	1.28	1.30
"Stabilite" (tons)	lb.	—	.48
"Alba" (tons)	lb.	—	.69
"L" (tons)	lb.	—	.48
Tannic Acid, Tech.	lb.	.75	.79
"Thermoflex" (dlvd.)	lb.	1.18	1.20
"A" (dlvd.)	lb.	.61	.63
"C" (dlvd.)	lb.	.54	.56
Thymol	lb.	—	2.50
"V-G-B"	lb.	.43	.45

ANTI-SCORCHING AGENTS

Salicylic Acid, Tech.	lb.	—	.33
"Vultrol"	lb.	.50	.55

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Muriatic Acid
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ANTISEPTICS AND GERMICIDES

Formaldehyde (barrels)	lb.	—	.057
"G-4"	lb.	.95	2.50
"G-11"	lb.	3.50	5.50
Ortho Cresol	lb.	.17½	.18
"Soligen Drier"—Copper 8% (drums)	lb.	—	.17
"Zinc 8%" (dms.)	lb.	—	.15¾

AROMATICS (DEODORANTS)

"Arolene 1980" (c.l.)	lb.	—	.10
"2286"	lb.	—	.25
"2553" (c.l., dms.)	lb.	—	.13
"Bouquet 149"	lb.	—	3.00
Coumarin	lb.	2.75	2.90
"Curodex 19"	lb.	—	4.75
"188"	lb.	—	5.75
"198"	lb.	—	6.75
"Deodorant 65"	lb.	—	1.00
"Deodorant L-37" (25 lbs.)	lb.	—	2.15
"L-44" (25 lbs.)	lb.	—	2.65
"Latex Perfume 5"	lb.	—	3.25
"6"	lb.	—	7.50
"9"	lb.	—	.65
"Neutroleum Delta"	lb.	—	2.40
"Gamma"	lb.	—	3.40
"Paradors A"	lb.	1.60	2.15
"B"	lb.	.65	1.00
"C"	lb.	2.75	3.25
"D"	lb.	1.50	2.00
"E"	lb.	.25	.55
"Rodo No. 0"	lb.	4.00	4.50
"No. 10"	lb.	5.00	5.50
"Rubber Perfume 7"	lb.	—	9.15
"12"	lb.	—	1.90
"Russian Leather 7"	lb.	—	4.10
Vanillin	lb.	2.35	2.40

BLOWING AGENTS

Ammonium Bicarbonate	lb.	.0564	.0651
"Blowing Agent No. 15"	lb.	—	.35
Sodium Bicarbonate, Tech. (c.l., bags)	cwt.	—	1.70
"Sponge Paste"	lb.	—	.20
"Unicel" (dlvd.)	lb.	—	.50
Urea	ton	68.00	85.00

BONDING AGENTS

"Bonding Resin 4162"	lb.	—	1.50
"Durez 12987"	lb.	.48	.53
"Reanite"	gal.	6.75	7.25
"Rex Compound 482"	gal.	—	1.05
"Ty-Ply Q" (and "S")	gal.	6.75	8.75

COAGULANTS

Acetic Acid—56% (bbls.)	cwt.	—	5.83
Glacial—99½% (bbls.)	cwt.	—	9.40
Calcium Nitrate, Tech, Crystals	lb.	.12½	.15
Zinc Nitrate, Tech.	lb.	.19½	.22

COLORING AGENTS

Black

Carbon Black—See *Reinforcing Agents*			
"Lampblack No. 10"	lb.	.06	.09
"Mapico Black Iron Oxide" (50 lb. bags)	lb.	.081	.0835

Blue

"Blue GD, Dispersed" (dlvd.)	lb.	—	3.95
"Paste" (dlvd.)	lb.	—	1.64
"Blue N" (dlvd.)	lb.	—	.90
"Blue YD, Dispersed" (dlvd.)	lb.	—	1.90
"Monastral Fast Blue CP" (dlvd.)	lb.	—	3.50
"PCD, Dispersed" (dlvd.)	lb.	—	1.95
"Ramapo Blue"	lb.	3.08	3.13
Ultramarine	lb.	.12	.30

Brown

Brown Iron Oxide	lb.	—	.10
"Mapico Brown" (50 lb. bags)	lb.	—	.1135

Green

Green Chromium Oxide, Pure	cwt.	—	26.00
Green Chromium Oxide, Pure, Hydrated	cwt.	70.00	85.00
"Green FD, Dispersed" (dlvd.)	lb.	—	1.35
"Monastral Fast Green GSD, Dispersed" (dlvd.)	lb.	—	2.85
"GSD Paste" (dlvd.)	lb.	—	1.10
"Pigment Green B"	lb.	1.35	1.40
"Ramapo Green"	lb.	3.60	3.65

Orange

"Molybdate Orange"	lb.	.31	.36
"Orange F" (dlvd.)	lb.	—	3.05
"FD, Dispersed" (dlvd.)	lb.	—	2.35
"OT" (dlvd.)	lb.	—	2.75

Purple

Purple Oxide	lb.	—	.08

Red

Barium Lithol Red	lb.	.60	.65
Calcium Lithol Red	lb.	.60	.65
"Graphic Red"	lb.	—	.60
Indian Red, Pure	cwt.	9.10	10.25
"Mapico Red 297" (50 lb. bags)	lb.	.0885	.096
"Oximony" Iron Oxide	lb.	—	.09
Red Iron Oxide, Light	cwt.	9.60	10.75
"Red PB" (dlvd.)	lb.	—	1.65
"PBD, Dispersed" (dlvd.)	lb.	—	1.50
"2B" (dlvd.)	lb.	—	1.65
"2BD, Dispersed" (dlvd.)	lb.	—	1.50
"Rubanox Red CP-762"	lb.	—	1.10
"Rubber Red CP-339"	lb.	—	.90
"Solfast Red CP-663"	lb.	—	1.55
"CP-787"	lb.	—	1.10
"Watchung Red"	lb.	1.65	1.70

White—Lithopone

"Albalith"	lb.	.04¼	.04¾
"Cryptone No. 19"	lb.	.056	.061
"CB No. 21"	lb.	.056	.061
"Eagle" (dlvd.)	lb.	.04¼	.04½
"Permalith"	lb.	.04¼	.04½
"Ponolith"	lb.	.04¼	.04½
"Ti-Tone"	lb.	.056	.0585

White—Titanium Pigments

"Raycal"	lb.	.05½	.05¾
"Rayox"	lb.	.14½	.16¾
"Titanox A"—all grades (dlvd.)	lb.	.14½	.15¾
"B-30" (dlvd.)	lb.	.05¾	.06
"C" (dlvd.)	lb.	.05½	.05¾
"RA"—all grades (dlvd.)	lb.	.15½	.16¼
"RC-HT" (dlvd.)	lb.	.05½	.05¾
"Ti-Bar"	lb.	.05¾	.06
"Ti-Cal"	lb.	.05½	.05¾
"Ti-Pure"	lb.	.14½	.17¼

White—Zinc Oxide (American Process)

"AZO-ZZZ 11" (and "22, 33, 44, 55") (dlvd.)	lb.	.07¼	.08
"Eagle" (dlvd.)	lb.	.07¼	.07½
"Horse Head Special"	lb.	.07¼	.08
"XX Red"	lb.	.07¼	.08
"Jozite"	lb.	.06	.06¼
"St. Joe Black Label" (dlvd.)	lb.	.07¼	.07½
"Green Label" (dlvd.)	lb.	.07¼	.07½
"Red Label" (dlvd.)	lb.	.07¼	.07½

White—Zinc Oxide (Dispersed)

Dispersed Zinc Oxide	lb.	—	.12

White—Zinc Oxide (French Process)

"AZO-ZZZ 66"	lb.	.09½	.10¾
"Kadox 72"	lb.	.07¼	.08
"Black Label"	lb.	.07¼	.08
"Red Label"	lb.	.07¼	.08
"Florence Green Seal"	lb.	.09	.09¾
"Red Seal"	lb.	.08½	.09¼
"White Seal"	lb.	.09½	.10¼
"U. S. P. 12"	lb.	.10½	.11¼

White—Zinc Sulfide

"Cryptone ZS-800"	lb.	.08¼	.08¾

Yellow

Chrome Yellow	lb.	.16	.21
"Chrome Yellow 12310"	lb.	—	.16
"Ferrox"	cwt.	—	7.38
"Mapico Yellow" (50 lb. bags)	lb.	.0685	.071
"Oximony" Iron Oxide	lb.	—	.06¾
"Yellow G" (dlvd.)	lb.	—	1.75
"GD, Dispersed" (dlvd.)	lb.	—	1.50
"HN" (dlvd.)	lb.	—	1.37
Yellow Iron Oxide, Pure	cwt.	7.10	8.25

DISPERSING AGENTS

"Agchem SA-19"	lb.	—	.30
"SA-20"	lb.	—	.70
"Aquasol-AR 90%"	lb.	—	.14½
"Darvan No. 1"	lb.	.15½	.35
"No. 2"	lb.	.19	.30
"Dispersaid"	lb.	1.25	1.35
"Dilex"	lb.	—	.32
"Halloid"	lb.	.03¾	.09½
"HornKem No. 1"	gal.	—	1.60
"No. 3G"	gal.	—	1.75
"No. 12"	lb.	—	.17
"Marasperse CB"	lb.	.10	.20
"Penetrol"	lb.	—	.20
"Plastak"	lb.	.089	.095
"Ramol PW"	lb.	.18	.19
"Rubbex"	lb.	.139	.14¾
Triethanolamine (drums) (dlvd.)	lb.	.19	.21
"Zinsper"	lb.	—	.15

EXTENDERS

"Advagum 1098"	lb.	—	.42
"D-92" (and "D-93") (drums)	lb.	—	.10
"Extender 600"	lb.	—	.13½
"HC-5"	lb.	.08½	.12
"HC-22"	lb.	.12	.15
"Multi-Plast MV 60 Emul."	gal.	.32	.37
"Naftolen MV 60 Emul."	gal.	.60	.65
"HV 60 Emul."	gal.	.75	.80
"Synprolac"	lb.	—	.19
"Synprowax"	lb.	.16	.19

FILLERS

Abrasives			
"Carbonite"	lb.	.15	.95
"Lionite"	lb.	.09¾	.90
Aluminum Hydrate	lb.	—	.14½
Barium Carbonate (l.c.l.)	ton	77.00	85.00
Barytes			
No. 1 Floated, White	ton	25.55	40.00
No. 2 Floated, Unbleached	ton	—	25.55
"No. 22 Barytes" (c.l.)	ton	—	18.37
"Foam A"	ton	—	25.35
Off-Color, Domestic (l.c.l.)	ton	29.00	32.00
Bentonite (c.l.)	ton	—	9.50
Blanc Fixe	ton	60.00	120.00
Calcium Carbonate			
"Atomite" (c.l.)	ton	—	27.50
"B.I. White No. 1" (c.l.)	ton	—	6.50
"Calcene T"	ton	37.50	47.50
"Camelwhite" (c.l.)	ton	27.50	30.00
"Kalite"	ton	26.00	52.00
"Kalvan"	ton	100.00	126.00
"Lesamite" (c.l.)	ton	—	27.50
"Lim-Cal" (c.l.)	ton	—	12.50
"Millical" (bags)	ton	18.00	30.00
"Suprex White"	ton	—	32.50
"Suspenso" (bags)	ton	17.00	29.00
"Swansdown" (bags)	ton	15.00	27.00
Calcium Silicate			
"Silene EF"	ton	110.00	120.00
Calcium Sulfate, Hydrous			
"Crysta-Cal" (c.l.)	ton	—	12.50
Chalk Whiting (l.c.l.)	lb.	.15	.17½
"Recco Paris Whiting"	ton	—	25.00
Clay			
"Alsite" (c.l.)	ton	—	11.00
"Aluminum Flake"	ton	15.00	30.00
"A.S.P. No. 1" (c.l.)	ton	—	30.00
"No. 11" (c.l.)	ton	—	40.00
"Buca" (c.l.)	ton	—	40.00
"Catalpo" (c.l.)	ton	—	30.00
"C.S.D." (c.l.)	ton	—	10.00
"Crown" (c.l.)	ton	—	11.00
"Dixie"	ton	11.00	23.50
"Hydratex R"	ton	20.00	32.50
"Kaolloid Clay" (c.l.)	ton	—	9.00
"Langford"	ton	—	8.50
"Markham"	ton	11.00	23.50
"McNamee"	ton	10.00	22.50
"Oldham"	ton	11.00	23.50
"Paragon"	ton	10.00	22.50
"Penna Clay" (c.l.)	ton	—	12.00
"Pigment 33" (c.l.)	ton	—	30.00
"Recco Clay" (c.l.)	ton	—	11.00
"Suprex"	ton	11.00	23.50
"Upton"	ton	19.50	21.00
"Whitetex" (c.l.)	ton	—	50.00
"Witco No. 1" (c.l.)	ton	—	11.00
"No. 2" (c.l.)	ton	—	10.00
Diatomaceous Earth	ton	30.00	50.00
"Kaylorite" (c.l.)	ton	—	30.00
Dolomite (c.l.)	ton	—	12.50
Flock			
Cotton	lb.	.08½	.20
"Filfloc F 40-9000"	lb.	—	.10½
"Filfloc F 6000"	lb.	—	.16
Rayon, bleached or dyed	lb.	.85	1.50
Rayon, grey	lb.	.10	.12
"Zvrox"	lb.	.35	.45
Wool, bleached or dyed	lb.	.70	1.00
Glue, Bone (dlvd.)	lb.	.16½	.18½
Ground Glass (l.c.l.)	lb.	.04	.06
Leather, Shredded	lb.	.05	.17
Lignin	lb.	.03	.06
Limestone, Pulverized	ton	3.25	10.00
"Micro Velva"	ton	30.00	32.00
"Velvet Filler, Regular"	ton	16.00	18.00
Magnesium Carbonate	lb.	.06¼	.07¼
"Clearcarb"	lb.	.09	.09½
"K & M"	lb.	.06¼	.07¼
Magnesium Silicate	ton	18.00	35.00
"Airex"	ton	22.50	23.50
"Asbestol"	ton	17.00	25.00
"L.S. Silver"	ton	22.50	23.50
"Sierra White"	ton	19.50	21.00
Mica	lb.	.03	.07
"Micro-Mica"	lb.	.06½	.07
"Mineralite" (c.l.)	ton	30.00	40.00
"Silversheen"	lb.	.05¼	.05¾
"Triple A Mica" (c.l.)	ton	—	25.00
"Wet Ground Mica No. 160"	lb.	.05¼	.06¾
Pumice	lb.	.03	.05
Pyrophyllite			
"Pyrax"	ton	10.00	25.00
Silica	ton	16.00	27.00
Slate, Powdered (l.c.l.)	ton	15.00	20.00
Talc, Domestic	ton	9.00	20.00
Whiting, Commercial	ton	8.00	20.00
"Cameline" (c.l.)	ton	8.50	10.00
"C-C-O White"	ton	—	14.00
"Keystone" (c.l.)	ton	—	14.00
"Snowflake" (c.l.)	ton	—	16.00
"Veroc" (c.l.)	ton	—	6.50
"York White" (c.l.)	ton	—	8.00
Wood Flour	ton	20.00	60.00

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Shellac, Orange Gum	lb.	.35½	.48½
"Vanwax 40"	gal.	—	1.30

FLAME RETARDANTS

Chlorinated Paraffin	lb.	.10	.25
"Zinc Borate 3167"	lb.	.12	.16¾
"Solka-Floc" (l.c.l.)	lb.	.06	.12

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"Aquadag"	lb.	3.15	3.45
"Aquarex L Paste" (dlvd.)	lb.	——	.85
"MDL Paste" (dlvd.)	lb.	——	.25
Borax, Granular (l.c.l.)	ton	56.00	61.00
"Colite Concentrate" (dms.)	gal.	——	.90
"Dipex"	lb.	.11	.13
"M"	lb.	.13	.15
"Dri-Lube"	lb.	——	.18
"Glycerized Lubricant"	gal.	——	1.50
"Glydag"	lb.	1.30	2.00
"G.T.M.C. Solution"	lb.	1.05	1.35
"Kokobace"	lb.	——	.12
"Lubrex"	lb.	.25	.30
"Migralube"	lb.	——	.30
"Moldex"	lb.	——	.12½
"Mold-Stick"	lb.	.202	.215
"Prodag"	lb.	.25	.38
"Redotex Flakes" (dlvd.)	lb.	.13⅞	.15⅛
"Powder" (dlvd.)	lb.	.14¼	.15½
"Rubber-Flo"	gal.	——	1.00
"Rubber-Glo"	gal.	——	.94
"Rusco Mold Paste"	lb.	.12	.18
Sericite (l.c.l.)	ton	65.00	75.00
Werkrite Flakes" (dlvd.)	lb.	.11¾	.13
"Powder" (dlvd.)	lb.	.12⅛	.13⅜

LUBRICANTS, RUBBER

Lithium Stearate	lb.	——	.60
Propylene Stearate (drums)	lb.	——	.40
"Rubberol"	lb.	——	.18½

LUBRICANTS, RUBBER SURFACE

Barium Stearate	lb.	.30	.31
Calcium Stearate	lb.	.25	.27
"Orel"	gal.	1.85	2.00
Polyethylene Glycol	lb.	.25	.26
"Rexanol A"	lb.	——	.11
"Separex A"	lb.	——	.15

MOLD CLEANERS

"Metso 99"	cwt.	3.05	4.45
"Granular"	cwt.	2.50	3.55
"Rubber-Sol"	gal.	——	1.89
Sodium Silicate	cwt.	.80	1.40

PEPTIZING AGENTS

Carbothermic Magnesia	lb.	——	.13½
"Peptizer P-12"	lb.	.07½	.083

PLASTICIZERS & SOFTENERS

"AA" (drums)	lb.	——	.15¾
"Acto 500"	lb.	——	.09
"Amalgamator Z-4"	lb.	——	.30
"American" Pine Tar	gal.	.25	.38⅛
"Bardex" (l.c.l.)	lb.	——	.04½
"Bardol"	lb.	.02½	.02¾
"B" (l.c.l.)	lb.	——	.05¼
"Bayol D"	gal.	.25	.26
"F"	gal.	.37	.40
Beeswax, Refined & Bleached	lb.	.56	.64
Yellow Refined	lb.	.54	.55
"Bondogen"	lb.	.55	.85
"B.R.C. No. 20"	lb.	.0105	.0115
"B.R.H. 2"	lb.	.02	.021
"B.R.T. 3"	lb.	.0175	.0185
"4"	lb.	.019	.02
"7"	lb.	.02	.021
"B.R.V."	lb.	.035	.0375
"Bunarex 10"	lb.	——	.05½
"100"	lb.	——	.05¼
"Bunatak M"	lb.	——	.20
"O"	lb.	——	.18
"R"	lb.	——	.14
"U"	lb.	——	.15
"No. 21"	lb.	——	.08
"No. 1080"	lb.	——	.09½
Burgundy Pitch	lb.	——	.10
"Butac"	lb.	.09½	.13¼
Butyl Benzyl Sebacate	lb.	.75	.77½
Butyl Palmitate	lb.	——	.26⅝
Butyl Roleate	lb.	.16	.18
"BWH-1"	lb.	——	.10
"Campol" (t.c.)	ton	——	42.00
Candelilla Wax, Prime	lb.	.72	.73
"Carbonex"	lb.	.0295	.03¼
"S"	lb.	.03	.03½
"S Plastic"	lb.	.0285	.0335
"Carbowax 4000" (drums)	lb.	.29	.30
"Cardolite 615"	lb.	.32	.35
"816"	lb.	.20	.23
"5858"	lb.	.42	.46
Carnauba Wax, Crude	lb.	1.30	1.75
Refined	lb.	1.45	1.46
Substitute	lb.	——	.45
"Celluflex 142" (and "179") (drums)	lb.	——	.31½
Ceresin Wax	lb.	.12	.18
"Contogum"	lb.	.06¾	.09¼
"Cumar Resins"	lb.	.05¼	.11¾
"D.B.M."	lb.	——	.30

PLASTICIZERS & SOFTENERS (Cont'd.)

Degras, Common	lb.	.10	.14
Diamylphenol (l.c.l., drums)	lb.	——	.21
Dibenzyl Ether (drums)	lb.	——	.40
Dibenzyl Sebacate	lb.	.66	.70½
Dibutyl Phthalate	lb.	.16	.24
Dibutyl Sebacate—Tech.	lb.	.49	.51½
C.P.	lb.	.51	.53½
Dicapryl Phthalate	lb.	.24½	.27
Di-carbitol Phthalate (l.c.l., drums)	lb.	——	.35
"Dielex"	lb.	.05½	.06
Diethyl Phthalate (t.c.)	lb.	——	.20½
Dihexyl Sebacate	lb.	.46	.48½
Dimethyl Phthalate	lb.	.19	.20½
Dimethyl Sebacate	lb.	.65	.67½
Dioctyl Phthalate (drums, dlvd.)	lb.	.35½	.36
Dioctyl Sebacate	lb.	.53	.54½
"Dipolymer Oil"	gal.	.33	.38
"Dispersing Oil No. 10" (l.c.l.)	lb.	——	.04
"Dutrex A" (and "6," "20," "25")	lb.	.02½	.03½
"15"	gal.	.17	.18
"Dyal 89"	lb.	——	.45
"Econo-Plast" (drums)	lb.	.03¼	.03¾
"ELA" (dlvd.)	lb.	——	.80
"Estac"	lb.	——	.14½
"Ethox" (l.c.l., drums)	lb.	——	.3065
"Flexol DOP" (drums, dlvd.)	lb.	.35½	.36
"Flexol 3GH"	lb.	——	.56
"3GO"	lb.	.52½	.53½
"4GO"	lb.	.39	.40
"H-70"	lb.	.56¾	.64½
"Hercolyn" (dlvd.)	lb.	.12	.16
"Herco-Plas"	lb.	——	.03
"Herco-Wax"	lb.	——	.03½
"HT-300"	lb.	.45¾	.53
"Indonex 633½" ("634½, 638½, 639½")	gal.	.14	.16
"JMH"	lb.	——	.65
"Kapsol" (l.c.l., drums)	lb.	——	.29
"Kronisol" (drums)	lb.	.297	.3065
"Kronitex" (drums)	lb.	.25½	.26½ [a]
"KP" (l.c.l., drums)	lb.	.29	.45
Lanolin, Tech., Anhydrous	lb.	.28	.30
Lead Oleate	lb.	.16½	.19¾
"Lindol" (drums)	lb.	——	.25½
2-Mercaptoethanol (drums)	lb.	——	.75
"Methox" (l.c.l., drums)	lb.	——	.3065
Methyl Oleate	lb.	——	.20
Methyl Stearate	lb.	——	.34
"Montan Substitute No. 506"	lb.	.314	.324
"Monten Wax" (c.l.)	lb.	——	.12
"Monty Wax"	lb.	——	.33
"Multi-Plast" (drums)	lb.	.04¼	.04¾
"Naftolen HV" (and "R-100") (drums)	lb.	.11	.12
"LV" and "MV" (drums)	lb.	.05¼	.05¾
"Nerium"	lb.	——	.09
"Nevillac Resins" (drums)	lb.	.17	.50
"Neville Resins" (drums)	lb.	.08½	.14¾
"Nevindene Resins" (drums)	lb.	.10½	.13½
"Nevinol" (drums)	lb.	——	.13
"Nevoll"	lb.	.02	.02½
"Nevtex 10" (drums)	lb.	——	.08
"90" (drums)	lb.	——	.20
"Nuba 1" (and "2") (drums)	lb.	——	.029
"3X" (drums)	lb.	——	.04½
"15 (and 30) Oil" (drums)	lb.	——	.17¼
"781 Oil" (drums)	lb.	——	.22
"No. 480 Oil Proof Resin"	lb.	.14	.14½
"Opalwax"	lb.	.22	.23
Ortho-Nitrobiphenyl	lb.	.06	.11
"Ozokerite Wax No. 64 White"	lb.	.31	.32
"Yellow"	lb.	.25	.26
"P-1" (and "4, 6, 8, 20") (drums)	lb.	.26½	.33
"P-75"	lb.	.66	.72
"Pale 4" (and "1000") (drums)	lb.	——	.17¼
Palm Oil	lb.	——	.11
"Paradene Resins" (drums)	lb.	.05¼	.06¼
"Para Flux" (drums)	gal.	——	.19
"2016" (l.c.l.)	gal.	——	.20
"Para Lube" (l.c.l.)	lb.	——	.048
"Parmo"	lb.	.04½	.12½
"Paroil 143"	lb.	——	.09¾
"170, Powdered"	lb.	——	.18
"Pentalene 90" (l.c.l., dms.)	lb.	——	.17
"92" (l.c.l., drums)	lb.	——	.25
"Pentaphen No. 114" (l.c.l., bags)	lb.	——	.23
"Pepton 22"	lb.	.70	.75
"PG-16" (drums)	lb.	——	.34
"Picco 10" (and "25")	lb.	——	.083
"75" (and "100")	lb.	——	.09
"S.O.S."	gal.	.29	.34
"Piccocizer 30"	lb.	.05½	.06
"D"	lb.	——	.10
"Piccolastic A" (and "B, C, D, E")	lb.	.20	.20½
"F"	lb.	.12½	.13
"Piccolyte S Resins"	lb.	.15	.18½
"Piccoumaron Resins"	lb.	.04½	.10¾
"Piccovar"	lb.	.10	.12½
"Piccovol"	lb.	.02	.02¾
"Pictar"	gal.	.18	.23
"Plas-Blend 360"	lb.	.02½	.03
"Plastac M"	lb.	.08¾	.09¼

PLASTICIZERS & SOFTENERS (Cont'd.)

"Plasticizer No. 7-2"	lb.	——	.60
"No. 11-2"	lb.	——	.32
"Plasticizer No. 1889"	lb.	——	.55
"No. 1919"	lb.	——	.52
"No. 2069" (l.c.l.)	gal.	——	.23
"No. 2070" (l.c.l.)	gal.	——	.27
"Plasticizer SC"	lb.	——	.50
"Plasticizer VA-1"	lb.	.33	.35
"Plastoflex 50"	lb.	.28	.29
"Plastogen"	lb.	.07¾	.12
"Plastone"	lb.	.27	.30
"Polymel Liquid"	gal.	.12	.17
"Polymel Resins"	lb.	.02½	.05½
"PT 101" ("400, 600, 800") (c.l., drums)	gal.	——	.31
"Refrigerator Oil 145-R"	gal.	——	1.25
"Reogen"	lb.	.11½	.15
"465 Resin" (drums)	lb.	——	.03½
"Resin 733" (dlvd.)	lb.	.0768	.0818 [a]
"Resin C"	lb.	.015	.016
"Resinex"	lb.	.01½	.03
"Ridbo 369" (drums)	lb.	.08	.09
"369-F" (drums)	lb.	——	.12
"R.P.A. No. 2" (dlvd.)	lb.	——	.65
"No. 3" (dlvd.)	lb.	——	.46
"No. 4" (dlvd.)	lb.	——	.80
"No. 5" (dlvd.)	lb.	——	.57
"R.S.N. Flux"	gal.	.10	.19
"R.S.O. Softening Oil"	lb.	.02½	.03
"Rubtar"	gal.	——	.40
"Santicizer B-16"	lb.	.32	.36
"E-15"	lb.	.34	.38
"M-17"	lb.	.35½	.39
"No. 140"	lb.	.25	.35½
"Softener No. 20"	gal.	——	.18
"S.P.C."	lb.	——	.19½
"S.R.O."	lb.	.02	.02¼
"Stanolind Petrolatum" (l.c.l.)	lb.	.032	.069
"Wax"	lb.	.25	.30
"Staybelite Resin" (dlvd.)	lb.	.0768	.0818 [a]
"Sunny South" Pine Tar	gal.	.25	.38⅛
"Superla Wax"	lb.	.23	.28
"Syncera Wax"	lb.	.16	.21
"Synplasticizer"	lb.	——	.10
"Syn Tac" (c.l.)	gal.	——	.33
"Synthol"	lb.	——	.22½
Tar, Refined	gal.	.10	.15
"K-Tarnel NR" (t.c.)	lb.	——	.0851
"Terpene A"	gal.	——	.65
"Thiokol TP-90 B" (and "TP-95")	lb.	.50	.65
Triacetin	lb.	.34	.45
Tricresyl Phosphate	lb.	.24	.25½
Triphenyl Phosphate	lb.	.26	.27
"Turgum S"	lb.	.07¾	.09¾
"Vanadiset A" (to "F")	lb.	.0165	.05
"Pulverized"	lb.	.08½	.21
"Solution"	gal.	.40	.65
"Vistac No. 1"	lb.	——	.17½

PROCESSING AIDS

Castor Oil, Processed (dms.)	lb.	——	.17¼
Refined (drums)	lb.	——	.15¾
"Castorwax" (min. 400 lbs.)	lb.	——	.25
"Resin No. 510"	lb.	——	.16

PROTECTIVE & STABILIZING AGENTS

"Agchem SA-9" (to "SA-12")	lb.	.65	1.02
"Aroostoocrat"	lb.	——	.07½
Acacia	lb.	.12½	.19
Carob Bean Flour	lb.	.45	.60
Casein	lb.	.24	.24¾
Ethylene Diamine 68%	lb.	.57	.58
Karaya Gum	lb.	.19	.45
Sodium Alginate	lb.	——	1.50
"Stablex B"	lb.	——	.95
Starch, Corn, Processed	lb.	.30	.0795
Tragacanth	lb.	.30	1.00

RECLAIMING AGENTS

"1-D Heavy Oil" (drums)	lb.	——	.89
"No. 517 High Boiling Oil"	gal.	.11½	.16½
"C-6 Oil" (and "C-6-A, C-28")	gal.	.33	.38
"C-10 Oil" (and "C-33")	gal.	.19	.24
Caustic Soda—Flake 76% (c.l., drums)	cwt.	——	2.95
Liquid 50% (t.c.)	cwt.	——	1.95
Solid 76% (c.l., drums)	cwt.	——	2.30
Cresylic Acid	gal.	.75	.83
"D-4"	gal.	.17	.22
"E-5"	gal.	.15	.20
"LX-83 Reclaiming Solvent"	gal.	.13	.23
"LX-572 Reclaiming Oil"	gal.	.20	.28
"Reclaiming Oil 1621" (l.c.l.)	lb.	——	.0235
"Reclaiming Reagent No. 3"	lb.	.12	.15
Soda Ash (c.l., bags)	cwt.	——	1.05
"Wilcor Reclaiming Oil No. 111" (drums)	gal.	.26	.30
"No. 151" (drums)	gal.	.26	.30
"X-1 Resinous Oil"	lb.	.011	.016
"X-60 Solvent"	gal.	.20	.28

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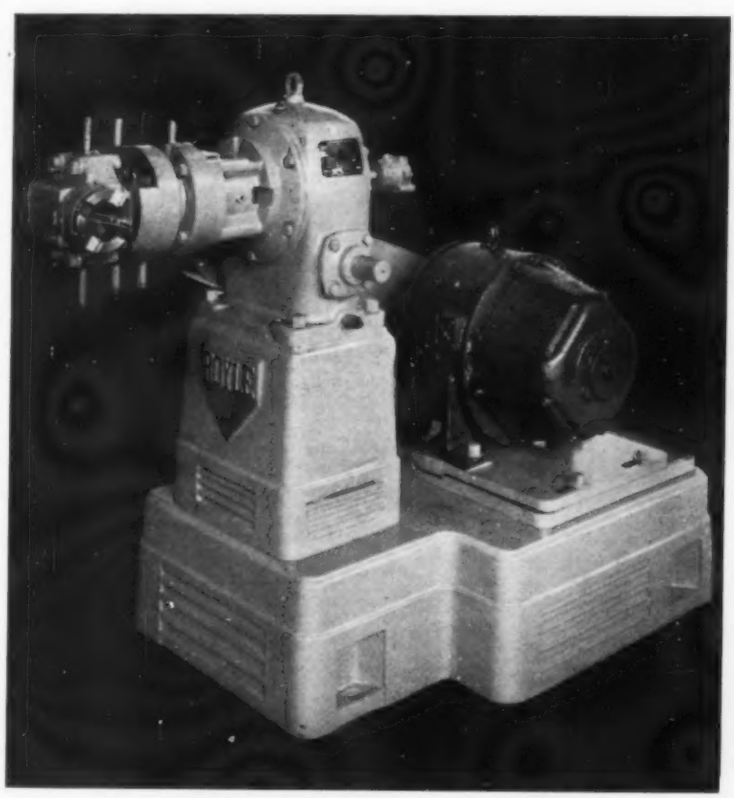

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REINFORCING AGENTS—CARBON BLACK

Channel, Hard Processing (HPC) (bags)

"Atlantic HPC"	lb.	.05¼ -	.092
"Continental F"	lb.	.05¼ -	.092
"Croflex"	lb.	.05¼ -	.092
"Crow"	lb.	.05¼ -	.092
"Dixie Ordinary"	lb.	.05325-	.097
"Dixiedensed" (and "S," "66")	lb.	.05¼ -	.092
"Huber HX"	lb.	.05¼ -	.092
"Kosmobile" (and "S," "66")	lb.	.05¼ -	.092
"Kosmos T"	lb.	.05¼ -	.092
"Spheron 4"	lb.	.05¼ -	.092
"Witco Disperso No. 6"	lb.	.05¼ -	.092

Channel, Medium Processing (MPC) (bags)

"Atlanjtic MPC"	lb.	.05¼ -	.092
"Colloidal Micronex" (dms.)	lb.	.06 -	.07
"Continental A"	lb.	.05¼ -	.092
"Croflex TH"	lb.	.05¼ -	.092
"Dixie R-1"	lb.	.05¼ -	.092
"Dixiedensed HM" (and "S-66")	lb.	.05¼ -	.092
"Huber TX"	lb.	.05¼ -	.092
"Kosmobile HM" (and "S-66, SMG"	lb.	.05¼ -	.092
"Kosmos M"	lb.	.05¼ -	.092
"Micronex Standard"	lb.	.05¼ -	.092
"Spheron 6"	lb.	.05¼ -	.092
"Witco Disperso No. 1"	lb.	.05¼ -	.092

Channel, Easy Processing (EPC) (bags)

"Atlantic EPC"	lb.	.05¼ -	.092
"Collocarb"	lb.	—— -	.065
"Continental AA"	lb.	.05¼ -	.092
"Croflex 77"	lb.	.05¼ -	.092
"Dixiedensed 77"	lb.	.05¼ -	.092
"Kosmobile 77"	lb.	.05¼ -	.092
"Micronex W-6"	lb.	.05¼ -	.092
"Spheron 9"	lb.	.05¼ -	.092
"Witco Disperso No. 12"	lb.	.05¼ -	.092
"Wyex"	lb.	.05¼ -	.092

Channel, Conductive (CC) (bags)

"Dixie 5" (and "B")	lb.	.05325-	.097
"Kosmink"	lb.	.05325-	.097
"Kosmos B"	lb.	.05325-	.097
"Spheron C"	lb.	.05¼ -	.092
"Spheron I"	lb.	.0525 -	.092
"Spheron N"	lb.	.15 -	.18½
"Voltex"	lb.	.10½ -	.14

Furnace, High Elongation (HFF) (bags)

"Sterling K"	lb.	.05 -	.07½

Furnace, High Modulus (HMF) (bags)

"Continex HMF"	lb.	.05 -	.07½
"Croflex 40"	lb.	.05 -	.07½
"Dixie 40"	lb.	.05 -	.07½
"Kosmos 40"	lb.	.05 -	.07½
"Modulex"	lb.	.05 -	.07½
"Philblack A"	lb.	.05 -	.06
"Statex 93"	lb.	.05 -	.06½
"Sterling L"	lb.	.05 -	.07½

Furnace, Semi-Reinforcing (SRF) (bags)

"Colloidal Black Dispersion 33" (drums)	lb.	.12¾ -	.13¾
"Continex SRF"	lb.	.03½ -	.05½
"Croflex 20"	lb.	.03½ -	.05½
"Dixie 20"	lb.	.03½ -	.05½
"Essex"	lb.	.03½ -	.05½
"Furnex"	lb.	.03½ -	.05½
"Gastex"	lb.	.03½ -	.06
"Kosmos 20"	lb.	.03½ -	.05½
"Pelletex"	lb.	.03½ -	.06
"Sterling R"	lb.	.03½ -	.06
"Sterling S"	lb.	.03½ -	.06

Furnace, Fine (FF) (bags)

"Statex B"	lb.	.05¼ -	.08½

Thermal, Fine (FT) (bags)

"P-33"	lb.	.04 -	.06½

Thermal, Medium (MT) (bags)

"Thermax"	lb.	.02¾ -	.05

REINFORCING AGENTS—OTHER

White

"Silical"	ton	65.00 -	85.00
"Witcarb R" (c.l.)	ton	—— -	100.00
"Witcarb R-12" (c.l.)	ton	—— -	32.50

Miscellaneous Reinforcing Agents

"Durez 12687" (and "12707")	lb.	.27½ -	.29
"Marbon B" (and "S-1, S-2")	lb.	.55 -	.65
"Marmix"	gal.	1.35 -	1.75
"Naftex SRF"	lb.	.04¾ -	.06½
"HMF"	lb.	.05¾ -	.07¾
"EPC"	lb.	.07 -	.09½
"Pliolite S-1"	lb.	.52 -	.55
"Synvarite RC Resins"	lb.	.27½ -	.29

RETARDERS

"E-S-E-N"	lb.	.34 -	.36
"Retarder W" (dlvd.)	lb.	—— -	.36
"Retardex" (tons)	lb.	—— -	.0445
"Thionex" (dlvd.)	lb.	—— -	1.25

RUBBER SUBSTITUTES

Mineral Rubber

"38"	ton	26.00 -	32.50
"Black Diamond"	ton	26.00 -	27.50
"Byerlyte"	ton	27.50 -	40.00
Gilsonite, Selects (c.l.)	ton	30.50 -	32.90
"Hard Hydrocarbon"	ton	25.00 -	27.00
Mineral Rubber, Granulated	ton	25.00 -	27.50
Solid	ton	20.00 -	22.50
"Parmr" (drums)	ton	25.00 -	29.00
"Pioneer"	ton	26.00 -	32.50

Vulcanized Vegetable Oils (Factice)

"Amberex"	lb.	.19 -	.20½
Brown	lb.	.10 -	.19
Dispersed	lb.	.17¼ -	.30¼
"Neophax"	lb.	.15½ -	.19
White	lb.	.09 -	.18½

Miscellaneous Rubber Substitutes

"Insulac W"	lb.	.05½ -	.06½
"Resin No. 1098" (drums)	lb.	—— -	.42
"No. 1198"	lb.	.31 -	.35
"Wilmex M-4" (and "M-6")	lb.	.05½ -	.06

SOLVENTS

Acetone (dlvd.)	lb.	.06 -	.07½
"American" Dipentene (t.c.)	gal.	—— -	.49
"Amsco" Lactol Spirits (t.c.)	gal.	—— -	.11½
"Rubber Solvent" (t.c.)	gal.	—— -	.11
"Solv A" (t.c.)	gal.	—— -	.18½
"Solv B" (t.c.)	gal.	—— -	.21½
"Special Napthalite" (t.c.)	gal.	—— -	.11
"Textile Spirits" (t.c.)	gal.	—— -	.11½
Amyl Chlorides, Mixed (l.c.l.) (drums)	lb.	—— -	.08
Benzol 90%	gal.	—— -	.21
Butyl Acetate (t.c.)	lb.	—— -	.18
Butyl Alcohol (t.c.)	lb.	—— -	.18½
Secondary (dlvd.)	lb.	.08½ -	.10
Tertiary (dlvd.)	lb.	.11 -	.13
Carbon Bisulfide, Tech.	lb.	.05¾ -	.08
Carbon Tetrachloride	gal.	—— -	.80
Cyclohexane	lb.	.11 -	.11½
Cyclohexanone	lb.	.30 -	.30½
Diacetone, Pure (dlvd.)	lb.	.10½ -	.12
Dichlorethyl Ether (drums)	lb.	.16 -	.17
Formal (drums)	lb.	.26 -	.27
Dichloropentane (l.c.l., (drums)	lb.	—— -	.04½
"Dipentene 122"	gal.	.56 -	.58
Ethyl Alcohol (t.c.)	gal.	—— -	.55½
Ethylene Dichloride (drums, dlvd.)	lb.	.07½ -	.08
Heptanes (t.c.)	gal.	—— -	.15
Hexanes (t.c.)	gal.	—— -	.15¾
Isopropyl Alcohol, Ref. 99% (dlvd.)	gal.	.35 -	.44½
Ether, Ref. (dlvd.)	lb.	.04½ -	.06½
Mesityl Oxide (dlvd.)	lb.	.10½ -	.12
Methyl Acetone, Syn. (drums, dlvd.)	gal.	.46 -	.52
Methyl n-Amyl Ketone (drums)	lb.	.29 -	.30
Methyl Ethyl Ketone (dlvd.)	lb.	.08 -	.09½
Methyl Isobutyl Ketone (dlvd.)	lb.	.10½ -	.12
"N-5" Pentane Mix. (t.c.)	gal.	—— -	.06⅛
"N-6" Hexanes (t.c.)	gal.	—— -	.10¼
"N-7" Heptanes (t.c.)	gal.	—— -	.09½
"Nevsol"	gal.	.21½ -	.28
"Petrolene" (t.c.)	gal.	—— -	.08⅝
Picolines, Alpha, Refined	lb.	.23½ -	.24½
Mixed	lb.	.24 -	.25
Pyridine, Refined	lb.	.44 -	.45
Quinoline	lb.	.24½ -	.25½
"Rubsol" (t.c.)	gal.	—— -	.07⅛
"Skellysolve B" (Hexanes) (t.c.)	gal.	—— -	.10½
"C" (Heptanes) (t.c.)	gal.	—— -	.10
"E" (Octanes) (t.c.)	gal.	—— -	.129
"R" (Solvent Naphtha) (t.c.)	gal.	—— -	.071
"Solvenol"	gal.	.56 -	.58
Solvent, Crude, Light	gal.	.27 -	.30
"Sunny South" Dipentene (t.c.)	gal.	—— -	.49
"Tollac"	gal.	.23 -	.28
Toluene (drums)	gal.	—— -	.32
Trichlorethane	lb.	.11 -	.12
Triglycol Dichloride (drums)	lb.	—— -	.49
"Tromex"	lb.	.078 -	.083
"X-7" Sp. Heptanes (t.c.)	gal.	—— -	.09
Xylene (drums)	gal.	—— -	.31

STABILIZING AGENTS (for Vinyl Resins)

Lead Stearate	lb.	—— -	.30
"Stabilizer V-1-N"	lb.	.44 -	.50
"Vanstay"	lb.	.38 -	.50

SUN CHECKING AGENTS

"Antisol"	lb.	.23 -	.24
"Heliozone" (dlvd.)	lb.	.23 -	.24
"Sunproof"	lb.	.22¾ -	.23¾
"Jr."	lb.	.16¼ -	.17¼
"Tonox"	lb.	.50 -	.52

TACKIFIERS

"Advaresin 100"	lb.	.11 -	.11½
"Agchem RC 30"	gal.	.65 -	1.34
"Beckopol 1400"	lb.	.19½ -	.20½
"Bunaweld 780"	lb.	—— -	.22
"5514"	lb.	—— -	.30
"Dutrex 44"	lb.	—— -	.11
"E-310 Resin Emulsion"	lb.	—— -	.14
"Koresin"	lb.	.52 -	.55
"Lindol Emulsion" (drums)	lb.	—— -	.27
"Liquid Rubber Flux"	lb.	—— -	.11
"Nevilloid C-55" (drums)	lb.	—— -	.12
"Pentacizer 344"	lb.	—— -	.20
"Pentalyn Resins" (dlvd.)	lb.	.14¼ -	.21
"Resin V"	lb.	—— -	.13¾
"Rubtack"	lb.	—— -	.10
"Staybelite Esters" (dlvd.)	lb.	.15 -	.23¾
"Super-Beckacite No. 1001"	lb.	.33 -	.34
"Synvarite RC-50"	lb.	—— -	.40

THICKENERS (FOR LATEX)

"Betanol" (drums)	lb.	—— -	.70
Propylene Laurate (drums)	lb.	—— -	.36
Sodium Silicate	lb.	.01 -	.02

VULCANIZING AGENTS

Selenium

"Vandex"	lb.	—— -	1.75

Sulfur

"Crystex" (l.c.l.)	lb.	.32 -	.35
"Dispersed Sulfur"	lb.	—— -	.09
"No. 2"	lb.	.08 -	.12
"Devil" (c.l.)	cwt.	—— -	1.35
"Insoluble Sulfur 60"	lb.	—— -	.16
"Star" (c.l.)	cwt.	—— -	1.85
"Tire" (c.l., dlvd.)	cwt.	—— -	2.05
"Tube" (c.l., dlvd.)	cwt.	—— -	2.40

Tellurium

"Latex Telloy"	lb.	—— -	1.75
"Telloy"	lb.	—— -	1.75

Miscellaneous Vulcanizing Agents

"VA-3"	lb.	.55 -	.65
"Vultac No. 1"	lb.	.38 -	.45
"No. 2"	lb.	.38 -	.45
"No. 3"	lb.	.42 -	.49

WASHING & FINISHING AGENTS

"Apcolene" (t.c.)	gal.	—— -	.08⅛
"Washine"	gal.	.20 -	.30

WETTING AGENTS

"Advawet No. 15"	lb.	—— -	.15½
"No. 33"	lb.	—— -	.43
"Aerosol OT 70% Clear"	lb.	.80 -	1.00
"Agchem SA-15" ("16, 18")	lb.	.17 -	.29
"Aquarex BBX Conc." (dlvd.)	lb.	—— -	.70
"D" (dlvd.)	lb.	—— -	.60
"ME" (dlvd.)	lb.	—— -	.82
"NS" (dlvd.)	lb.	—— -	.75
"Areskap 50"	lb.	.18 -	.24
"Dry 100"	lb.	.39 -	.51
"Aresket 240"	lb.	.16 -	.22
"Dry 300"	lb.	.42 -	.50
"Aresklene 375"	lb.	.35 -	.50
"Dry 400"	lb.	.51 -	.65
"Santomerse D"	lb.	.11 -	.25
"S"	lb.	.41 -	.65
"Stablex G"	lb.	—— -	.70
"Yelkin C"	lb.	—— -	.55
"TT"	lb.	.25 -	.35½

MISCELLANEOUS CHEMICALS

"Acto 450" ("550-W," "600," "630")	lb.	.09¾ -	.11½
"Agchem SA-17"	lb.	—— -	.29
"Aquarex SMO" (dlvd.)	lb.	—— -	.40
"A.S.T.M. Oil No. 1"	gal.	1.00 -	1.15
2-Ethylhexanol (dms., dlvd.)	lb.	.25 -	.26
Glycerine, 88% Sap., Crude (dlvd.)	lb.	.14 -	.14½
"Hydrozo"	lb.	—— -	.51
"MODX" (tons)	lb.	—— -	.29½
"Para Resin No. 1784"	lb.	—— -	.09¾
"No. 2457"	lb.	—— -	.04
"No. 2718"	lb.	—— -	.04
"Reference Fluid SR-6"	gal.	.85 -	1.00
"SR-10"	gal.	.60 -	.75
"Resin No. 1226"	lb.	.31½ -	.36½
Resorcinol (dlvd.)	lb.	—— -	.64
"Rio Resin"	lb.	.36 -	.38
"Santocel"	lb.	—— -	.50
"Sublac"	lb.	.25 -	.27
"Synpep N" (drums)	lb.	—— -	.54
"Tysonite"	lb.	.16½ -	.17¼
"Vinsol Resin"—Lumps (dlvd.)	lb.	.02½ -	.03 [a]
Pulverized (dlvd.)	lb.	.02½ -	.03½ [a]

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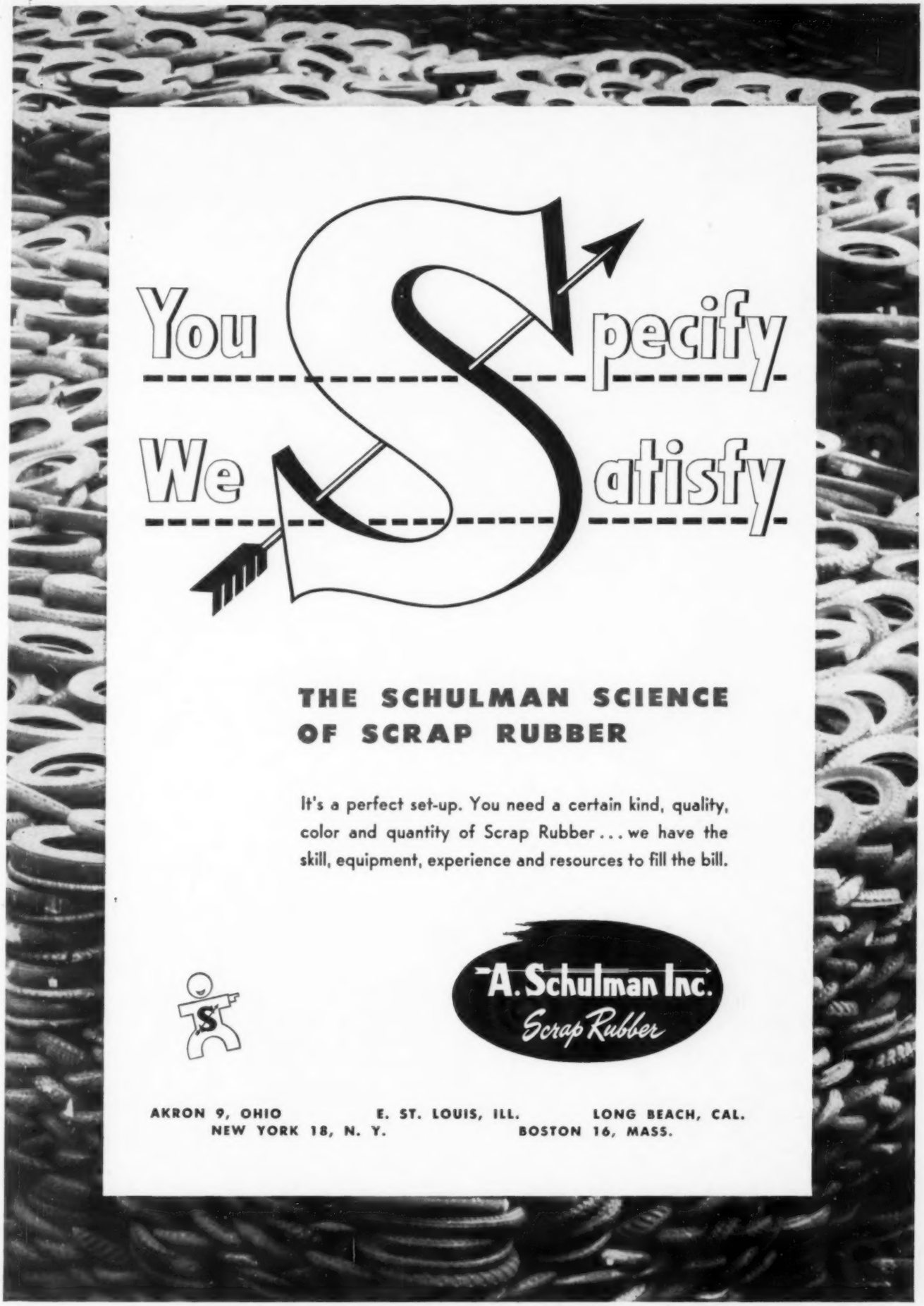
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